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ABSTRACT

This guide contains pest control information for commercial vegetable production. It was prepared for agricultural supply dealers, extension agents, fieldmen, and growers. It gives general precautions, information on seed treatment, growing disease-free seedlings and transplants, general soil insect control, general weed control, and spraying equipment. The guide also gives individual pest control suggestions for twenty-four crops. Finally, it contains application and formulation information for many herbicides, insecticides, and fungicides. (BB)

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1976 COMMERCIAL VEGETABLE PEST CONTROL GUIDE

The Pennsylvania State University, Cooperative Extension Service, University Park, Pennsylvania

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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1976 COMMERCIAL VEGETABLE PEST CONTROL GUIDE

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INTRODUCTION

This publication contains pest control information for commercial vegetable production. It was prepared for agricultural supply dealers, extension agents, fieldmen, and growers.

Days To Harvest: Days required between final application of a pesticide and harvest is noted in brackets [ ] in front of most fungicides and insecticides.

Pesticide uses listed in this guide are registered by the Pesticides Regulation Division of the United States Environmental Protection Agency.

Abbreviations

A = acre(s)

/A = per acre

bu = bushel(s)

cc = cubic centimeter(s)

cu ft = cubic foot (feet)

cu yd = cubic yard(s)

D = dust

E = emulsion

EC = emulsifiable concentrate

EL = emulsifiable liquid

F = flowable

°F = degrees Fahrenheit

ft = foot (feet)

G = granule(s)

gal = gallon(s)

HP = horsepower

lb = pound(s)

LC = liquid concentrate

mph = miles per hour

oz = ounce(s)

% = percent

PTO = power take off

psi = pounds per square inch

qt = quart(s)

S = sprayable

SP = soluble powder

sq ft = square foot (feet)

tbs = tablespoonful(s)

tsp = teaspoonful(s)

WD = wettable dust

WP = wettable powder

PRECAUTIONS

Trial Pesticide Use: Use pesticides, even though labeled, on a limited basis until experience is gained with their use.

Follow The Label: Pesticide misuse can result in excessive residues on crops. Residues will remain within legal limits if pesticides are used as directed on the label. If you have any doubt about appropriate use of any pesticide, do not use it until you consult your county extension agent.

Reduce Pesticide Drift: Mist from high-pressure sprayers and dust from granular material may drift when wind velocity is high. Apply pesticides only when wind velocity is low (5 mph or less).

Avoid 2,4-D Herbicide Injury: Three formulations of 2,4-D are available: amine, sodium salt, and ester. Amine and sodium salt formulations of 2,4-D are recommended when this herbicide is used near susceptible crops. Ester formulations of 2,4-D are volatile and tend to cause more crop injury than either amine or sodium salt formulations; thus, ester formulations should not be used near susceptible crops. Susceptible crops include grapes, fruit trees, ornamentals, soybeans, snap beans, tobacco, and tomatoes.

After using 2,4-D, spray equipment must be thoroughly cleaned with ammonia solution before the equipment is used to apply other pesticides to susceptible crops. The safest plan is to use separate application equipment for 2,4-D.

Seed Treatment

Insects:

To help prevent damage to germinating seeds and seedlings from maggots and other soil pests, it is strongly suggested that all beans, peas, sweet corn, and vine crop seeds be treated with an insecticide-fungicide mixture before planting. Several commercial seed treater preparations are available:

1) Diazinon - sweet corn, peas, lima beans, snap beans.
2) Lindane - sweet corn, beans, peas, cucumber, cantaloupes, watermelons, squash, pumpkin.
3) Lorsban 25-SL - sweet corn, lima beans, snap beans.

Select the one best suited for your needs. Follow label directions and manufacturer's recommendations for dosage, use, and limitations.

Diseases:

Specific seed treatment recommendations are listed under each crop.

GROW DISEASE-FREE SEEDLINGS AND TRANSPLANTS

Produce disease-free seedlings and transplants by following these steps:

A. Use disease-free seed. Infested or infected seed is a major source of many vegetable disease problems (e.g., anthracnose and bacterial blights of beans; black rot, blackleg, and downy mildew of crucifers; early blight and late blight of celery; Phomopsis blight of eggplant; mosaic virus of lettuce; bacterial spot of peppers; downy mildew of spinach; bacterial spot, early blight, Septoria blight, and tobacco mosaic virus of tomato). Purchase disease-free seed or seed that was treated to rid it of disease-causing organisms. If this is not possible, treat seed as suggested under "Seed Treatment" sections for each crop.

B. Use plant-growing containers free of disease-causing organisms. Use new containers or sterilize wooden flats and clay pots with steam or hot water (180°F for 30 min.).

C. Use a planting medium free of disease-causing organisms. Damping-off organisms are common in raw field soil. Some other disease-causing organisms survive as special resistant structures or in plant debris. Avoid diseases caused by these organisms by using soil-free mixes, steamed soil or soil mixes, or chemically-treated soil or soil mixes.

1. Soil-free growing media. Fresh soil-free mixes are relatively free of disease-causing organisms. The following formula is practical for vegetable plants.

Material	Amount for one cu yd of mix
Shredded sphagnum peat moss (loose)	11 bushels
Horticultural vermiculite (sizes 2, 3, 4)	11 bushels
Dolomitic limestone (pulverized)	2.5 to 5 lb
20% superphosphate (pulverized)	1.25 to 2.5 lb
Potassium nitrate or calcium nitrate	1 lb
Trace elements - 1) Fritted trace elements (e.g. FTE)	1 oz, or
2) Borax (11% boron), plus chelated iron (e.g., NaFe, 138,330.	0.5 oz (Borax) plus 1 oz (chelate)

Fertilize with 15-15-15 at transplanting (4 to 6 oz/100 gal) and then at weekly intervals (8 to 12 oz/100 gal). If chlorosis develops, apply supplemental chelated iron at rates recommended on the product label.

2. Steam treatment. Steam soil until entire soil mass is 180°F for 30 min.; store soil for 2 weeks after treatment to avoid plant damage from toxic materials released during steaming.

3. Chemical treatment. Soil treated with chemicals will be pasteurized but rarely completely sterilized.

a. Chemicals suitable for small lots of soil include:

(1) Formaldehyde — Use 7.5 tsp in a cup of water for 1 bu of soil.

(2) Chloropicrin — Use 3 to 4 cc/sq ft in greenhouse beds, potting soil, seedbeds, and flats of soil.

(3) Vapam — Use 13.5 fluid oz of 32.7% anhydrous material/cu yd of potting soil.

b. Chemicals for outdoor plant beds and field seedbeds include:

(1) Chloropicrin — Use alone with a water seal (485 to 1076 lb/A), alone with a plastic seal (150 to 200 lb/A), or with dichloropropenes and a plastic seal (319 lb chloropicrin plus 240 lb dichloropropenes/A).

(2) Methyl bromide — Use alone (1 to 2 lb actual/100 sq ft) or in combination (82 to 111.5 lb chloropicrin + 167.5 to 234.5 lb methyl bromide/A), both with a tarp. Use only for vegetable transplant production and tomato crop production.

(3) Vapam — Either apply in water to wet soil 3 to 4 inches deep (2 pints/100 sq ft); dilute and sprinkle onto soil surface (2 pints/100 sq ft), rototill in, roll, and seal with water; dilute and inject (1.5 to 2 pints/100 sq ft; 75 to 100 gal/A), roll, and seal with water; or, dilute and sprinkle onto soil surface (1.3 pints/100 sq ft), and tarp.

(4) Vorlex — Inject into soil at rates of 0.5 to 1 pint/100 sq ft, 25 to 50 gal/A on light soil, or 40 to 60 gal/A on heavy soil.

D. Follow sanitary practices. (a) Use plant-growing containers that are free of disease-causing organisms. (b) Keep seedlings and transplants isolated from mature plants. (c) Hang up the end of the watering hose to keep it off the walk. (d) Treat benches to kill disease-causing organisms. (e) Destroy weeds in the vicinity of plant-growing areas. (f) Keep animals out of greenhouses and other plant growing areas. (g) Keep walks and areas under benches free of debris. (h) Keep feet off benches. (i) Do not use contaminated transplanting equipment.

E. Keep plants and soil from remaining wet for long periods of time. Water plants in greenhouses and cold frames only in the morning of sunny days. Avoid excessive crowding. Avoid wide fluctuations in temperatue. Ventilate to keep relative humidity as low as possible; provide air movement to dry plants if necessary.

Choose well-drained field seedbed sites. Avoid areas that are shaded for long periods of time.

F. Use post-emergence fungicide sprays or drenches on some crops. They help prevent damping-off in celery, eggplants, lettuce, and peppers.

GENERAL SOIL INSECT CONTROL

Garden Centipedes (Symphylans):

If small areas of a field are producing poor plants, check for Symphylans as a possible cause. Take soil samples with a shovel when the soil temperature is above 45°F and when soil moisture is suitable for working the soil — not too wet or too dry. Carefully break apart several shovelsful of soil and look for very small, white, centi-

pede-like animals scurrying about seeking a place to hide. If samples are taken in the spring, control is usually warranted if there is an average of more than two Symphylans per shovelful. If samples are taken in the fall, control is usually warranted if four to five Symphylans per shovelful are found.

Dyfonate, 20 pounds of 10 G per acre, broadcast and incorporated into the top 4 to 6 inches of soil before planting the crop is suggested. Only infested areas of the field need to be treated. Check label for vegetables that may be planted following a Dyfonate treatment.

Slugs:

Metaldehyde baits — use commercial formulations and follow label for dosage rates and directions.

Wireworms:

If you had wireworm problems in a field last season or if you are planting vegetables in an old sod field, check for wireworms.

With a shovel, check at numerous spots in the field. If you find an average of more than one wireworm for four shovelsful of soil, treatment is suggested.

Materials suggested are Diazinon 21 to 28 pounds of 14 G per acre or its equivalent or Dyfonate 40 pounds of 10 G per acre broadcast and incorporated into the top 6 inches of soil before planting. Check labels for vegetables that may be planted following treatment.

GENERAL WEED CONTROL INFORMATION

Weeds are Costly:

Weeds take water, fertilizer, and light from vegetable plants, often reducing yield and quality. They increase labor and equipment costs, harbor insects and disease organisms, and reduce land values. For our purposes, a weed is defined as any unwanted plant. Most weeds are wild plants; however, crop plants growing out of place are also weeds.

Weeds in vegetable crops fit into three fairly distinct categories--grasses, sedges, or broad-leaves. All true grasses are members of the Gramineae family. The only sedge of importance is nutsedge (nutgrass). All other weeds are considered to be broadleaf types. Under Important Weeds Controlled (pages 31 to 36), all annual grasses are alphabetized, then annual and biennial broad-leaf weeds. Perennials are generally listed last. Remember, seedling perennials are no more difficult to control than any other weed seedlings, but once established, perennial weeds are the most difficult to control.

Total Weed Management Needed:

Effective weed control requires a total program that emphasizes prevention, by combining mechanical, rotational cropping, biological, and chemical methods.

Weed seed populations in the soil should be kept to a minimum by preventing weeds from going to seed in and around vegetable fields. Destroy all weeds immediately after a crop is harvested, till, and plant to a cover crop.

Crop areas should be adequately limed. Liming to the fullest extent for crop growth not only gives better weed control (by generally favoring the crop over the weed and often increasing herbicide activity), but also results in less carryover of atrazine and related herbicides.

Choosing and Handling Herbicides:

The judicious use of herbicides offers the greatest single potential for weed control in vegetable crops. The choice of herbicide for a particular field is dictated by the kind of vegetable being grown and the weed to be controlled. There are many situations in which the target weeds cannot be controlled chemically if a particular vegetable is being grown. However, if a different crop is grown, another herbicide can be used to control the weeds readily. For example, ragweed is hard to control in cabbage because herbicides that are currently registered for use on cabbage do not control ragweed. On the other hand, several herbicides for use in corn and bean fields are selective for those crops, and control ragweed. This principle applies to many crops and weeds. Thus, crop rotation is a simple, effective method for obtaining good weed control on a long-range basis.

Herbicides (liquid or granular) applied to the soil surface are most effective when either applied to moist soils or followed by rainfall or irrigation. Examples of moisture-incorporated herbicides are Dacthal, Norex, Pyramin RB, Tenoran, and Vegadex. Other herbicides require mechanical or

physical incorporation into the soil. Examples are Eptam, Prefar, Ro-Neet, Sutan, Tillam, and Treflan. Dymid and Enide benefit from either moisture incorporation or mechanical incorporation.

The double disk, a highly effective tool for soil preparation, is often used for incorporating herbicides. Unfortunately, it can be a poor tool for the latter use unless it is adjusted carefully and used properly. If the disk angle is excessive, much of the treated soil is thrown towards the outer edges of the disked area; however, if the angle is not wide enough, inadequate mixing may result. Thorough mixing can be obtained by properly adjusting disk angle and depth and then cross-disking the field at the proper tractor speed for prevailing soil type and moisture conditions. Less thorough incorporation can result in irregular or streaked patterns of poor weed control and occasional crop injury. The spike-tooth harrow, rotary hoe, and cultimulcher usually have not been satisfactory for incorporating herbicides.

Time of Herbicide Application:

Herbicides used to control weeds in vegetable crop plantings are applied as (1) pre-plant treatments, before the crop is planted; (2) pre-emergence treatments, applied at the time of planting, or some time before the emergence of the crops; (3) post-emergence treatments, applied after the crop plant has emerged; or (4) post-transplanting treatments, applied after the crop is transplanted.

In addition to considering the application of an herbicide on a crop status basis, the grower must also consider the stage of weed development. Certain herbicides are effective only when applied to the soil before weed seedlings have emerged. Other herbicides may be effective only if applied after weed seedlings have emerged. In a few instances, a particular herbicide may be applied either before or after weed seedlings emerge.

Quackgrass Control:

A combination of chemicals plus tillage offers the most efficient control of this common perennial grass. Some chemicals and their limitations are:

Chemical	Limitations
dalapon	Foliage spray. Cleared for use in asparaugs. Can be applied in the fall prior to spring planting of dry beans lima beans, snap beans, and sweet corn. Plow down 10 to 20 days after treatment or delay plowing until spring.
Eptam	Apply to soil in spring and incorporate immediately. Plant only to snap beans and dry beans the same spring.
Eradicane	For sweet corn only. Otherwise, the same as Eptam.
atrazine (2 lb) followed by	Apply to soil in late March or early April before sweet corn is planted. Corn must follow corn when using this treatment.
atrazine (2 lb) plus Lasso	Apply preemergence to sweet corn the same year.

Use Eradicane; or 1 lb atrazine plus either Sutan+ or Bladex in corn the year before rotating to another vegetable crop.

Nutsedge (Nutgrass) Control:

Nutsedge reproduces primarily by small tubers or nutlets which form in the summer and fall. Complete foliage control is therefore necessary from early July, until a hard freeze occurs. Serious infestations result from poor drainage, improper crop/herbicide rotations and failure to control nutsedge foliage after the vegetable crop is removed in the late summer or early fall. Chemicals and tillage both help to prevent foliage growth and tuber formation. Eptam is safe and effective for beans. Sutan and Eradicane are satisfactory for sweet corn. Tillam is suitable for tomato transplants or at last cultivation (layby) on established plants. With warm soils, pre-plant, pre-emergence incorporated applications are preferred (except Tillam on direct-seeded tomatoes -- see remarks for direct-seeded tomatoes at layby on p. 27). For early planting when the soil is cold, better results are obtained by delaying applications until the nutsedge is beginning to emerge. Granulars can be broadcast over emerged crops. The soil and plant surfaces should be dry and the field cultivated immediately after treating.

Ragweed Control:

Ragweed is not adequately controlled by any herbicides currently registered for cole crops (broccoli, Brussels sprouts, cabbage,

and cauliflower). It is therefore a serious problem in these crops and dictates periodic rotations with other crops where it can be controlled. It can be controlled in crops where AAtrex, Alanap, Amiben, Betanal, Bladex, Karmex, Knoxweed, Lorox, Norex, Princep, Pyramin RB, Ramrod 65, Tenoran, Vegiben 2E, or 2,4-D can be used.

See pp. 31 to 35 for a listing of crops on which the above herbicides can be used to control ragweed.

A Few Herbicide Reminders:

Know your weed species; use only herbicides registered for use on the intended crop; know the herbicide's limitations; use the recommended rate of application; always leave a small "check" or guard row strip; and READ AND FOLLOW THE LABEL.

SPRAYING EQUIPMENT

Spraying for vegetable production falls into two categories: (1) weed control and (2) disease, insect, and growth control. Low-volume low-pressure boom sprayers are recommended for weed control with either broadcast or band application; these sprayers usually apply 20 to 40 gal/A at 20 to 40 psi. Both airblast sprayers and high-volume (100 to 500 gal/A) boom sprayers are successfully used to spray growing crops for disease, insect, and/or growth control.

Equipment Checks

Before using a sprayer, make the following checks:

1. Suction, in-line (if used), and nozzle screens are in place and clean.

2. Pump is working properly and the desired pressure can be maintained.

3. Nozzles are clean and not seriously worn. Worn nozzles may apply a different rate, produce a distorted pattern, fail to atomize the spray properly, or cause any combination of these failures. Use water only to check nozzle output by catching the spray from individual nozzles in individual jars; equal size nozzles should have equal flow. Patterns should be even with no heavy streams or skips.

4. Tank is free of dirt and previously used chemicals.

Calibration

After the sprayer is working properly, calibrate it to determine the rate of spray application. Select nozzles, pressures, and travel speed before calibrating; maintain the same conditions during field spraying so the same rate will be maintained.

The application rate can be adjusted by changing nozzle size, pressure, speed, or combinations of these. If a change is made, rerun the calibration to determine the new rate accurately.

Most calibration methods suggest spraying a small known area. The following table indicates distances required to cover certain small areas.

Sprayed Width (feet)	Feet of Travel to Cover 1/10 Acre	1/4 Acre	1 Acre
15	290	726	2904
20	218	545	2178
25	174	435	1742
30	145	363	1452
35	124	311	1244
40	109	273	1089
45	97	242	968
50	87	218	871

Add water to the sprayer tank, either to capacity or to some known level, and then spray the selected area. Accurately measure the amount of water required to refill the tank to the previous level. Determine the gallons per acre. For example, if 25 gal were sprayed on 0.25 A, the application rate is 100 gal/A. Add the amount of chemical desired per A for every 100 gal of water in the tank.

For more details on boom sprayers, obtain the leaflet, "How to Calibrate Your Boom Sprayer," available from your county Extension agent.

Adding the Chemical

The amount of chemical needed per tankful depends on the recommended rate and the number of acres you can treat per tank of spray.

To determine the number of treated acres per tank, divide the tank capacity (gallons) by the application rate (gallons per acre). Multiply the number of treated acres per tankful by the recommended pesticide rate to find the amount of chemical to add to the tank.

For example, if your sprayer has a 150-gallon tank and it applies 15 gallons per acre, each tankful will cover 10 acres (150 ÷

15). If two pounds of chemical per acre are recommended, you should add 20 pounds (10 acres x 2 pounds per acre) to the tank.

Check Performance

Check for coverage by examining the plants or area immediately after spraying. Don't try to stretch the swath width of air-blast sprayers. Fine mist or fog at the far edge of the swath does not insure coverage or control. These small droplets may bounce off the plants and stay suspended in the air giving a false impression of coverage. In little or no wind, there should be a slight mist 10 to 15 feet beyond the effective coverage width. The effective width of an air-blast sprayer depends on the air velocity and volume at the fan discharge, on wind, and on travel speed. Effective width can be increased somewhat by driving slower.

Avoid spraying when wind velocity is above 5 mph. Although you may apply the correct amount per A, the distribution is poor due to distorted patterns.

When applying wettable powders, be sure to have adequate agitation in the tank to keep a uniform suspension of powder particles. Any noticeable accumulation of the powder indicates a serious deficiency in agitation.

When using PTO-powered air-blast sprayers, match tractor size to sprayer requirements. The tractor must have enough total horsepower to operate the sprayer at rated PTO speed and maintain a constant ground speed on all terrain conditions. PTO-powered air-blast sprayers require up to 60 HP for the sprayer alone. Check with your dealer or manufacturer to determine sprayer HP requirements. Add 15 to 30 HP, depending on terrain and weight of sprayer including water, for transport power to determine tractor size. Also check that the tractor can travel at the desired ground speed when operating the PTO at rated speed.

Maintenance

Check nozzles for wear; and screens for dirt. Rinse the sprayer each day and thoroughly clean the sprayer when changing chemicals, and at the end of the season. A good cleaning solution is one pound of detergent in 50 gal water. Or, for 2,4-D and organophosphates, one to two quarts of household ammonia in 50 gal water. For more details see Special Circular 81, "Weed Control Sprayers - Calibration and Maintenance," available from your county Extension agent.

ASPARAGUS

Weed Control

Annual weeds:

Diuron (Karmex) at 0.8 to 2.4 lb active/A. Apply 1 to 3 lb/A of Karmex in 50 or more gal water/A before asparagus starts growth in spring, but no earlier than 4 weeks before spear emergence. To be effective diuron must be applied before weeds emerge or immediately after any existing weeds have been killed by tillage. Another application may be made after the cutting season. Use lighter rates on lighter soils. Use only on established beds.

Simazine (Princep 80 W only) at 2 to 4 lb active/A. Use only on established beds. Apply 2.5 to 5 lb of Princep 80 W in 20 or more gal water/A to beds established one year or more. Make one application per year after disking in the spring and before weeds emerge. Spring application must be made at least 3 days before first cutting.

Perennial weeds:

2,4-D at 1.5 to 2 lb/A. Apply either 1.5 to 2 lb/A of the 95% sodium salt formulation of 2.4-D or 1.5 to 2 quarts of Formula 40 in at least 10 gal water/A. Apply after a close cutting of asparagus to actively growing weeds. If used after harvest, avoid spraying spears or ferns. It controls annual broadleaf weeds and perennials such as dock, dandelion, and bull thistle.

Dalapon (Dowpon M or Basfapon B) at 17 lb active/A. Apply 20 lb/A of Dowpon M or Basfapon B. Use for quackgrass control. Apply in the fall to quackgrass foliage after the asparagus fern has been killed by frost or direct spray under the fern. For isolated patches of grass use 1 lb Dowpon M or Basfapon B in 10 gal water.

Insect Control

Asparagus Aphid:

[1] Malathion 1.25 lb actual/A = 1 qt 57 E or 5 lb 25 WP. This small bluish-green aphid causes rosetting of the brush. Present in southeastern counties, but it has not been a problem during the past few years.

Number in [ ] refers to minimum days between last application and harvest

Asparagus Beetles:

[1] Carbaryl (Sevin) 1 lb actual/A = 2 lb 50 WP or 1.25 lb 80 S or

[1] Malathion 1.25 lb actual/A = 1 qt 57 E. Apply insecticide when needed but do not use carbaryl more often than every three days or

[3] Methoxychlor 1.5 lb actual/A = 3 lb 50% WP. If applied within 3 days of harvest remove residue by washing or blanching.

Cutworms:

[1] Carbaryl (Sevin) 1 lb actual/A = 2 lb 50 WP or 1.25 80 S. Make application in evening when needed to protect the spears.

Disease Control

Rust:

Do not start new plantings next to old plantings. Destroy wild asparagus. Grow recommended resistant varieties such as Mary Washington, Waltham Washington, or Rutgers Hybrid. If disease appears, spray after harvest with Polyram, zinc ion-maneb, or maneb (all at 2 lb 80% WP/A) at 10-day intervals. Do not apply before harvest.

Fusarium wilt and root rot:

Plant disease-free roots in fields where wilt has not previously appeared. Dip roots for 1 minute in a solution of captan (3 lb 50% WP/100 gal). Select well drained fields not planted to asparagus for 8 years. Resistant varieties are being developed.

BEANS (DRY)

Seed Treatment

See page 9 under SNAP BEANS.

Weed Control

Fall Treatment to Control Quackgrass:

Dalapon (Dowpon M or Basfapon B) at 8.5 to 12.75 lb active/A. Apply 10 to 15 lb/A of Basfapon B or Dowpon M on land to be planted to beans the following spring. Apply during September or early October to actively growing quackgrass. Plow down in 10 to 20 days or delay plowing until spring. For further quackgrass control follow with EPTC, pre-seeding.

Pre-seeding:

EPTC (Eptam) at 3 lb active/A. Apply 3.5 pints of Eptam 7-E in 20 or more gal water/A. Apply to well-worked soil that is dry at the surface and dry enough to permit good incorporation. Incorporate immediately. Do not apply to lima beans. Excellent on nutsedge (nutgrass).

Trifluralin (Treflan) at 0.5 to 1 lb active/A. Apply 1 to 2 pints of Treflan in 20 to 40 gal water/A. Incorporate with the top 2 to 4 inches of soil. Incorporation may be delayed up to 8 hours. Use the lighter rate on sandy soils and up to 1 lb on heavy soils. Variable weed control may result from delayed incorporation if applied to a wet, warm soil.

Pre-emergence:

Dinoseb, amine salt (Premerge) at 7.5 to 9 lb active/A. Highly toxic. Apply 2.5 to 3 gal of Premerge in about 30 gal water/A. Best results occur using half the above rates just prior to crop emergence (no later than "crook" stage), at temperatures of 55° to 80°F. Use lighter rates on lighter soils.

Chloramben (Amiben) at 2 to 3 lb active/A. Apply to 1.5 gal/A or 20 to 30 lb/A of 10% G Amiben at or immediately after seeding.

Insect Control

Mexican Bean Beetle:

[0] Carbaryl (Sevin) 0.5 lb actual/A = 1 lb 50 WP or 0.66 lb 80 S or

[1] Methomyl (Lannate, Nudrin) 0.5 lb actual/A = 2 pint 1.8 L. or

[3] Methoxychlor 1 lb actual/A = 2 lb 50 WP or 2 qt 25 E.

Use insecticides only when needed.

Leafhoppers:

[60] Di-Syston granules 6 to 12 oz of 15G/1000 ft of row = 6.7 to 13.3 lb/A (30-inch row spacing). Place the granules in a band on each side of the seed furrow at planting time only. Do not apply directly on the seed. Highly toxic material.

[60] Phorate (Thimet) granules 6 to 9.3 oz of 15G/1000ft of row for any row spacing = 6.5 to 10 lb/A (30-inch row spacing). Place the granules in a band on each side of the seed furrow at planting time only. Do not apply directly on the seed. Highly toxic material.

[0] Carbaryl (Sevin) 1.0 lb actual/A = 2 lb 50 WP or 1.25 lb 80 S or

[1] Methomyl (Lannate, Nudrin) 0.25 to 0.5 lb actual/A = 1 to 2 pint 1.8L. or

Number in [ ] refers to minimum days between last application and harvest

[3] Methoxychlor 1 lb actual/A = 2 lb 50 WP or 2 qt 25 E.

Seed Maggots:
See section on Seed Treatment (page 2).

Disease Control

See page 10 under SNAP BEANS.

BEANS (LIMA)

Seed Treatment

Use seed dusted with thiram (2 to 3 oz 75% WP/100 lb) or captan (3 to 3.8 oz 50% WP/100 lb). Where stand maintenance has been a problem use Demosan as an additional seed treatment; use a slurry (4 oz 65% WP/100 lb), or a planter box treatment (32 oz 10% D/100 lb).

Weed Control

Fall Treatment to Control Quackgrass: See remarks under DRY BEANS.

Pre-seeding:
Trifluralin (Treflan) at 0.5 to 0.75 lb active/A. Apply 1 to 1.5 pints of Treflan in 20 or more gal water/A. Do not exceed 0.75 pint. See other remarks for trifluralin under DRY BEANS.

Pre-emergence:
Chloramben (Amiben) 2 to 3 lb active/A. Apply 1 to 1.5 gal/A or 20 to 30 lb/A of 10% granular Amiben. Apply on planting day. Small-seeded more tolerant than large-seeded types.

Dinoseb, amine salt, (Premerge) at 7.5 to 9 lb active/A. Highly toxic. Apply 2.5 to 3 gal/A of Premerge. See other remarks for dinoseb under DRY BEANS.

Insect Control

Aphids:
[7] Diazinon 0.75 lb actual/A = 1.5 pint AG 500 or
[0] Dimethoate (Cygon, Defend) 0.33 lb actual/A = 1 pint 2.67 E or
[60] Di-Syston or Phorate (Thimet) See leafhopper control under BEANS (DRY).

Leafhoppers:
[0] Carbaryl (Sevin) 1 lb actual/A = 2 lb 50 WP or 1.25 lb 80 S or
[3] Methoxychlor 1 lb actual/A = 2 lb 50 WP or 2 qt 25 E.
Di-Syston or phorate at planting time as for aphids will also be effective for approximately four weeks.

Mites:
[0] Dimethoate (Cygon, Defend) 0.33 lb actual/A = 1 pint 2.67 E or
[7] Kelthane 0.35 lb actual/A = 1 lb 35 WP.
Mite infestations usually develop in late July and August.

Seed Maggots:
See section on Seed Treatment (page 2).

Tarnished Plant Bug:
[0] Carbaryl (Sevin) 1 lb actual/A = 2 lb 50 WP or 1.75 lb 80 S or
[0] Dimethoate (Cygon, Defend) 0.33 lb actual/A = 1 pint 2.67 E.
Three spray applications are suggested at 10-day intervals starting when first blossom buds form.

Disease Control

Downy mildew:
If disease appears, spray at 4- to 7-day intervals with [4] maneb (1.5 to 2 lb 80% WP/100 gal).

Syringae blight:
Eliminate lilac and wild cherry near lima bean fields. Use disease-free seed. Some varieties are resistant to some races; Thaxter is resistant to Race A and Bridgton is resistant to Races A and B. Recently, Race C appeared and no varieties have resistance to this race.

Sclerotinia white mold and Botrytis gray mold:
Plant on well-drained soil not recently planted to beans, potatoes, tomatoes, lettuce, or cabbage. Weed control, wide-row spacing, and locating fields away from windbreaks, promote drying and help control disease. Spray lima beans with [28] Benlate (1.5 to 2 lb 50% WP/A) at bloom.

BEANS (SNAP)

Seed Treatment

Use seed dusted with thiram (1.3 to 2.2 oz 75% WP/100 lb) or captan (3 to 3.8 oz 50% WP/100 lb). Where stand maintenance has been a problem, use Demosan as an additional seed treatment; use a slurry (4 oz 65% WP/100 lb) or a planter-box treatment (32 oz 10% D/100 lb).

Weed Control

Fall Treatment to Control Quackgrass: See remarks under DRY BEANS.

Pre-seeding:

EPTC (Eptam) at 3 lb active/A. Apply 3.5 pints of Eptam 7-E in 20 or more gal water/A. For nutsedge (nutgrass) control, existing stands of nutsedge must be turned under and chopped up thoroughly before treatment. See other remarks for EPTC under DRY BEANS.

Trifluralin (Treflan) at 0.5 to 0.75 lb active/A. Apply 1 to 1.5 pint/A of Treflan. See other remarks for trifluralin under DRY BEANS.

Pre-emergence:

Dinoseb, amine salt (Premerge) at 7.5 to 9 lb active/A. Highly toxic material. Apply 2.5 to 3 gal/A of Premerge. See other remarks for dinoseb under DRY BEANS.

Insect Control

Same as for DRY BEANS.

Disease Control

Root rots:

Rotate beans with other crops. Promote rapid germiantion and growth by shallow planting in well-drained soil. Use fungicide-treated seed. Use Demosan as an additional fungicide treatment either (a) applied to the seed (see snap bean seed treatment), or (b) applied to the soil as a planter-box in-furrow granule (13 oz 10% C/1000 linear ft) or as an in-furrow spray (2 oz 65% WP/1000 linear ft) applied with dual row nozzles directed onto the seed and backward on the covering soil.

Rust:

Rotate beans with other crops. Harvester and Bush Romano 14, green bean varieties resistant to some races of rust, may be helpful. If disease appears, spray at 7-day intervals with [4] maneb (3 lb 80% WP/150 gal/A) or [7] Bravo (3 pints 6F/A), or [0] sulfur (30 lb actual D/A or 4 to 7.8 lb actual WP/100 gal). Sulfur may injure some varieties.

Anthracnose and bacterial blight:

Use western-grown seed. Practice a 2-year rotation and plow under bean stubble in the fall.

For anthracnose, apply [0, dry; 4, succulent] maneb (1.5 to 2 lb 80% WP/100 gal) at 4- to 7-day intervals, or [7] zineb (1 to 2 lb 75% WP/100 gal) at 4- to 10-day intervals.

For bacterial blight, 2 or 3 early applications of [0] Kocide (2 lb 86% SP/A), or [0] fixed coppers (manufacturer's directions) reduce spread. Redkote dry bean has good halo blight resistance.

Sclerotinia white mold and Botrytis gray mold:

Plant on well-drained soil not recently planted to beans, potatoes, tomatoes, lettuce, or cabbage. Weed control, wide-row spacing, and locating fields away from windbreaks promote drying and help control disease. Spray snap beans with [14] Benlate at green bud stage and again in 5 to 7 days (1 lb 50% WP/A).

Powdery mildew:

At first signs, apply [0] sulfur as a dust (30 lb actual/A) or as a spray (4 to 7.8 lb actual/100 gal); sulfur may injury some varieties.

Common mosaic (BCMV = BV-1):

Grow varieties resistant to this seed-borne virus. Most varieties are resistant to the common strain; the following are also resistant to the NY-15 strain; Harvester, Astro, Tendercrop, and Resistant Kinghorn Wax.

Yellow mosaic (BYMV = BV-2):

Grow beans at least 800 feet from over-wintering host plants (clover, sweet clover, gladiolus). Avoid growing late beans adjacent to early beans. There are no resistant varieties: Blue Lake, Refugee types, and Red Kidney are very susceptible.

Dry (Fusarium) root rot:

Practice a 5- or 6-year rotation. Destroy bean straw and plow under any bean refuse left in fields. Plant on well-drained soil with a balanced fertility level; avoid close cultivation that would break new roots.

BEETS

Seed Treatment

Use seed treated with either (a) Dexon, dry or slurry (8 oz 35% WP/100 lb = 1.6 tsp/lb), or (b) thiram, dry or slurry (5.3

Number in [ ] refers to minimum days between last application and harvest

oz 75% WP/100 lb = 1 tsp/lb), or (c) captan, dry (18 oz 50% WP/100 lb = 3.6 tsp/lb) or slurry (7 to 12 oz 50% WP/100 lb = 1.4 to 2.4 tsp/lb).

Weed Control

Pre-seeding:

Cycloate (Ro-Neet) at 3 to 4 lb active/A. Apply 4 to 5 pint/A of Ro-Neet and incorporate with top 2 to 3 inches of soil immediately. Apply only to well-worked seedbeds.

Pre-emergence:

Pyrazon (Pyramin RB) at 3.2 to 4 lb active/A. Apply 4 to 5 lb/A of Pyramin RB after seeding, but before beets and weeds emerge. If rain does not fall within 5 to 10 days after treatment, irrigate to activate Pyramin RB.

Pyramin RB also can be applied early post-emergence at the 5 lb rate. Treat after beets have 2 expanded true leaves and before any weeds have more than 2 to 4 true leaves. This is usually within 2 weeks after planting.

Insect Control

Flea Beetles:

[7] Malathion 1.25 lb actual/A = 1 qt 57 E. Control measures are usually not needed. Usually most damage is to young seedlings.

Leaf Miners:

[14] Diazinon 0.25 to 0.5 lb actual/A = 0.5 to 1 pint AG 500. Control measures are seldom needed unless tops are used for greens. A preventative spray program is then suggested. Begin sprays when plants have four leaves and repeat at weekly intervals.

Disease Control

Damping-off and seed rot:

Use fungicide-treated seed. Solubor (25 lb/A banded) reduces soil-line damping-off somewhat.

Cercospora leaf spots:

Follow a 2-to 3-year rotation. Plow under beet refuse. Most table beets are resistant. If disease develops, spray with [0; 7 if tops are eaten] zineb (3 lb 75% WP/150 gal/A) at 7 to 10 day intervals, or with [0] fixed copper applied at manufacturer's directions.

CABBAGE, CAULIFLOWER, BROCCOLI, AND BRUSSELS SPROUTS

Seed Treatment

To help control blackleg and black rot, untreated seed should be soaked in 122°F water. Soak broccoli, cauliflower, kale, and Chinese cabbage for 20 minutes, soak Brussels sprouts and cabbage for 25 minutes. Dry at room temperature. For damping-off control, dust seed before planting with thiram (5.3 oz 75% WP/100 lb = 1 tsp/lb) or captan (3.6 oz 50% WP/100 lb = 0.7 tsp/lb).

Weed Control

Pre-emergence (seedbeds):

CDEC (VEGADEX) at 3 to 4 lb active/A. Apply 3 to 4 qt of Vegadex in 20 or more gal water/A soon after seeding. Irrigation immediately after treatment increases the effectiveness. Do not use chemical under plastic.

DCPA (DACTHAL) at 6 to 10.5 lb active/A. Apply 8 to 14 lb of Dacthal 75% WP in at least 40 gal water/A. Use lighter rates on lighter soils. Use good agitation in tank. After seeding, treat before weed seeds germinate. Irrigate if no rain within 3 days after application. Ragweed, smartweed, galinsoga not effectively controlled.

Pre-plant (direct-seeded or transplants):

Trifluralin (Treflan) at 0.5 to 0.75 lb active/A. Apply and incorporate 1 to 1.5 pint/A of Treflan before transplanting or seeding. Direct-seeded cole crops have exhibited marginal tolerance to recommended rates of Treflan. Stunting or reduced stands may occur. See other remarks for trifluralin under DRY BEANS.

Post-transplanting:

DCPA (Dacthal) at 6 to 10.5 lb active/A. Apply 8 to 14 lb/A of Dacthal 75% WP. Can be applied directly over transplants. See other remarks for DCPA under CABBAGE, Pre-emergence (seedbeds).

Post-emergence or post-planting:

Nitrofen (TOK 50WP) at 4 lb active/A. Apply 8 lb/A of TOK 50% WP. Direct-seeded or transplanted crops should be well established and growing rapidly (at least 2 weeks after emergence or setting of crop, or when direct-seeded cabbage is 1.5 to 2 inches tall). TOK 50WP must be applied when weeds are small or just emerging. TOK

E-25 is not recommended for post-emergence use. Important: do not combine TOK with other pesticides, fertilizers, or wetting agents.

Insect Control

Aphids:

[14-42] Di-Syston 15% granules. 7.4 oz of 15G/1000 ft of row (6.7 lb/A). Side dress granules on both sides of the row soon after plants are set. Days from application to harvest will vary with the crop. If Di-Syston granules are not used, one of the following materials can be used as a spray.

[5,7] Diazinon 0.5 lb actual/A = 1 pint AG 500.

[3,7] Dimethoate (Cygon, Defend) 0.33 lb actual/A = 1 pint 2.67 E or

[3.7] Meta-Systox-R 0.5 lb actual/A = 1 qt 2 E. or

[7,21] Monitor 0.5 to 1 lb actual/A = 1 to 2 pints 4 E. Monitor is highly toxic.

Cabbage Looper:

[0] Biotrol XK 1 to 1.5 lb/A or

[0] Dipel 0.5 to 1 lb/A or

[0] Thuricide HPC 1 to 2 qt/A.

Dosage rates for Biotrol, Dipel, and Thuricide are suggested on a formulation basis. Use the bacterial insecticides on a regular weekly basis. or

[14] Fundal 0.5 lb actual/A = 1 pint 4 E or

[14] Galecron 0.5 lb actual/A = 0.5 lb 95 SP or

[1-3] Methomyl (Lannate, Nudrin) 0.45 to 0.9 actual/A = 1 to 2 quarts 1.8L or

[14-35] Monitor 0.5 to 1 lb actual/A = 1 to 2 pints 4E.

Loopers are usually a problem from August to October. A regular spray schedule at weekly intervals is suggested.

Cabbage Worm:

[3] Carbaryl (Sevin) 1.5 lb actual/A = 2 lb 80 S or

[7, 14] Endosulfan (Thiodan) 1 lb actual/A = 2 lb 50 WP.

These materials should give good early season control at moderate cost.

The insecticides suggested for cabbage looper will also control cabbage worms.

Flea Beetles:

[3] Carbaryl (Sevin) 1 lb actual/A = 1.25 lb 80 S or

[7, 14] Endosulfan (Thiodan) at 1 lb actual/A = 2 lb 50 WP.

Apply control measures only when needed.

Root Maggots:

1) Transplant Water Treatment: A preventive transplant water treatment is recommended for plants set in the field. Use 4 to 6 ounces of setting water per plant. Agitation of the solution is necessary to prevent settling-out of the wettable powder.

	Rate per 50 gallons of water
Guthion 50% WP	0.25 to 0.375 lb
Diazinon 50% WP	0.25 to 0.5 lb

2) Drop Nozzle Treatment: Apply with a sprayer equipped with drop nozzles to direct a drenching spray to the base of the plants. Apply immediately after transplanting. Agitation of the solution is necessary to prevent settling-out of wettable powder.

Dyfonate 4-EC: Use 1 to 2 qt in 400 gal water/A.

Guthion 50% WP: Use 2 to 3 lb in 400 gal water/A.

Diazinon 50% WP: Use 2 to 4 lb in 400 gal water/A.

Additional treatments may be necessary.

Disease Control

In the Seedbed

Clubroot, blackleg, and damping-off:

Fumigate with methyl bromide, Vapam, chloropicrin, or Vorlex (see p. 3). Damping-off is reduced by these treatments although soil is subject to recontamination.

Damping-off:

As a pre-plant treatment, apply a mixture of Terraclor (37 lb actual/A = 13.6 oz/1000 sq ft) and captan (14 lb actual/A = 5.1 oz/1000 sq ft) and mix with the top 4 inches of soil with a rake or rototiller.

Downy mildew:

Use hot water treated seed. Apply maneb (1.5 lb 80% WP/100 gal) at first sign of disease; continue at 3-day intervals.

In the Field

Clubroot:

Where field soil is not infested, avoid introducing the disease organism on transplants or machinery. Where field soil is infested, avoid these fields and practice a 7-year rotation. It this is not possible,

Number in [ ] refers to minimum days between last application and harvest

some control is obtained by either adjusting pH of field soil to 7.2 or using at least 1500 lb/A of hydrated lime in the spring. Use disease-free transplants produced in non-infested seedbed soil. If control in addition to use of hydrated lime is required, use Terraclor in transplant water (6 lb 75% WP/100 gal) at 0.3 pint per plant. Do not use liquid Terraclor. Provide good agitation. Do not use Terraclor in soils where carrots or parsnips will be planted within 3 years.

Fusarium yellows:
Grow resistant varieties.

Blackleg and black rot:
Destroy or plow under all crucifer refuse. Practice a 3-year (black rot) or a 4-year (blackleg) rotation. Use hot water-treated seed and disease-free transplants. Do not dip transplants.

If blackleg appears: (a) Do not irrigate affected fields. (b) When moving from affected fields to fields without disease, hose down equipment with water and then swab with a 10% Clorox solution. (c) Harvest as soon as heads are ready; do not store cabbage from affected fields.

Downy mildew and alternaria leaf spot:
Use hot water-treated seed (direct seeded) or disease-free transplants. Use of fertilizer high in phosphorus and low in potash reduces plant susceptibility to mildew. Spray with [0] Bravo or [0, 3, 7] maneb; use a spreader-sticker. Bravo (for mildew only): use 1.5 pints 6F/A at 7- to 10-day intervals or as necessary. Maneb (for both diseases): (a) on Brussels sprouts and cauliflower, use 1.5 lb 80% WP/100 gal at 7- to 10-day intervals; (b) on broccoli, use 2 lb 80% WP/100 gal at 10-day intervals and stop applying 3 days before harvest or wash and trim; (c) on cabbage, use 1.5 to 2.5 lb 80% WP/A at 3- to 5-day intervals and stop applying 7 days before harvest. A finish-off spray with [0] fixed copper (applied at manufacturer's directions) is helpful if mildew has been bad.

Bottom rot and head rot:
Use transplants from beds free of damping off and wirestem. Avoid short rotations with crucifers.

CARROT

Seed Treatment

Use seed treated with thiram (5.3 oz 75% WP/100 lb = 1 tsp/lb) as a dust or as a slurry.

Weed Control

Pre-seeding:
Trifluralin (Treflan) at 0.5 to 1 lb active/A. Apply 1 to 2 pints/A of Treflan and incorporate before seeding. See other remarks for trifluralin under DRY BEANS.

Pre-emergence:
Chloroxuron (Tenoran or Norex) at 3 to 4 lb active/A. Apply 6 to 8 lb/A of Tenoran or Norex 50% WP. If sufficient rain has not fallen to wet the soil thoroughly, irrigate within 2 days.

Post-emergence:
Chloroxuron (Tenoran or Norex) at 3 to 4 lb active/A. Apply 6 to 8 lb/A of Tenoran or Norex 50% WP. Apply over the top of carrots after true leaves form. Do not apply within 60 days of harvest.

Linuron (Lorox) at 0.75 to 1.5 lb active/A. Apply 1.5 to 3 lb of Lorox 50% WP in 25 to 40 gal water/A after carrots are at least 3 inches tall. Total amount cannot exceed 2 lb active per acre. Linuron may be applied after petroleum solvents, provided applications are at least 1 day apart. Do not plant treated areas to crops not on label within 4 months after treatment. Some carrot varieties may be sensitive.

Petroleum Solvents-These include various herbicidal oils, of which Stoddard Solvent or dry cleaning fluids are widely used. Apply 75 to 100 gal/A of Petroleum Solvents after true leaves have formed (2- to 4-leaf stage) or when root is only 0.25 inch in diameter. Plants may be damaged after they reach a height of 6 inches. Petroleum Solvents may be applied after linuron provided applications are at least 2 weeks apart. Do not apply within 40 days of harvest. Does not control ragweed.

Insect Control

Leafhoppers:
[0] Carbaryl (Sevin) 1 lb actual/A = 2 lb 50 WP or 1.25 lb 80 S or
[7] Malathion 1.5 lb actual/A = 2.5 pints of 57% EL or
[14] Methoxychlor 1 lb actual/A = 2 lb 50 WP or 2 qt 2 E.
Begin leafhopper sprays when plants are about 2 inches tall. Repeat at 2-weak intervals until mid-August. Leafhoppers trans-

mit aster yellows; therefore, the plants need continuous protection.

Aphids:
[10] Diazinon 0.5 lb actual/A = 1 pint A 500 or 1 lb 50% WP.

Beet Armyworm, Lygus Bugs:
[28] Trichlorfon (Dylox, Proxol) 1 to 1.5 lb actual/A = 20 to 30 oz 80SP.

Disease Control

Root knot nematode:
Fumigate upland soil with D-D (20 gal/A, ethylene dibromide (4.5 to 6 gal 83% liquid/A), Telone (16 gal/A), or Vorlex (12 gal/A). Fall treatment is best. Allow 14 to 21 days before planting. Do not use ethylene dibromide where onions will be planted within 3 years.

Leaf blight:
Remove tops from fields and rotate crops to reduce fungus carry over in crop refuse. Where blight has been a problem, begin fungicide sprays when seedlings are 3- to 4-inches tall and continue at 7- to 10-day intervals; generally 3 to 5 applications are sufficient. Use [7] zinc ion-maneb (2 lb 80% WP/A), or [0] maneb (1.5 lb 80% WP/A) or [0] Bravo (1.5 pints 6F/A); add urea (10 lb/A) to each spray to encourage new leaf growth. Do not use zinc ion-maneb treated tops for food or feed.

Carrot yellows:
Use insecticides to control leafhopper vectors.

CELERY

Seed Treatment

Use seed 2 years old or older. Soak newer seed at 118°F for 30 minutes; then dry seed at room temperature.

Weed Control

Post-planting:
CDEC (Vegadex) at 4 to 6 lb active/A. Irrigate celery immediately after transplanting. Apply 1 to 1.5 gal/A of Vegadex as a directed spray when soil is again dry (about 2 days). Do not apply later than 3 weeks after transplanting.

Insect Control

Cabbage Looper:
[14] Methomyl (Lannate, Nudrin) 0.9 lb actual/A = 2 qt 1.8L. Not a problem every year. When present, usually shows up in September.

Tarnished Plant Bug:
[14] Guthion 1 lb actual/A = 2 pints 2L. Spray when bugs are noticed on the plants. They often move to celery when surrounding grain and hay fields are cut.

Disease Control

Pink rot, damping-off, nematodes:
Fumigate seedbed soil with chloropicrin, Vapam or Vorlex. For nematodes only, use D-D or Telone (see page 3).

Damping-off:
Use fumigated seedbed soil. Spray with ferbam (1 to 2 lb 76% WP/100 = 1 to 2 tbs/gal) as soon as plants are up; if damping off appears, repeat at 2-week intervals as necessary. Sprays with thiram (1.3 lb 75% WP/100 gal = 1.3 tbs/gal; 15 to 25 gal/1200 sq ft) at 3-day intervals also will help.

Early and late blight:
Use treated seed. Use disease-free transplants grown in a fumigated seedbed or in a seedbed not recently planted to celery. Plow under celery refuse. Practice long rotations. Avoid cultivating when plants are wet. Spray with one of the following fungicides: [0] Dyrene (2 lb 50% WP/A), or [7] Bravo (2 pints 6F/A), or [14] zinc ion-maneb (2 lb 80% WP/A), or [14; strip, trim, and wash] maneb (1.5 lb 80% WP/A), or [0] Bordeaux (8-4-100), or [7] Benlate (0.5 lb 50% WP/A) alternated with other materials. Follow a 7-day schedule in production fields and, if the label permits, a shorter interval in seedbeds.

CUCUMBER

Seed Treatment

Seed should be treated with captan 50% WP or thiram 75% WP (3 oz/100 lb = 0.6 tsp/lb).

Weed Control

Pre-seeding:
Bensulide (Prefar) at 5 to 6 lb active/A. Incorporate 5 to 6 qt/A of Prefar to a depth of 1 to 2 inches. Apply only to

well-worked soil that is dry enough to permit thorough mixing. To avoid injury to crops not specified on the label, do not plant until 18 months after the last Prefar application.

Pre-emergence:

Dinoseb, amine salt, (Premerge) at 2 to 3 lb active/A. Highly toxic material. At seeding, band-treat 0.7 to 1 gal/A of Premerge over the row. Sow seed at least 1 inch deep. Not as safe as Alanap under adverse conditions, but better weed control. Injury may occur if heavy rain follows application. Use lighter rates on lighter soils. Do not use on sandy soils.

Naptalam, sodium salt, (Alanap) at 4 to 6 lb active/A. Apply 2 to 3 gal/A of Alanap in bands over the row within 48 hours of seeding. Soil should be moist at time of application. Use lighter rates on lighter soils. Do not use when weather is cold and wet.

Pre-plant or pre-emergence:

Bensulide (Prefar) at 4 to 6 lb active /A plus Naptalam, sodium salt, (Alanap) at 2 to 4 lb active/A. Apply a tank-mix combination of 1 to 1.5 gal Prefar plus 1 to 2 gal Alanap in 20 to 40 gal water/A. Incorporate lightly (0.5 to 1 inch) into the soil just prior to planting. If application is followed by an immediate irrigation or rain, incorporation is not necessary. Use lighter rates on lighter soils. Observe all cautions and limitations on labeling of all products used in mixtures.

Post-emergence:

Naptalam, sodium salt, (Alanap) at 2 to 4 lb active/A. Apply 1 to 2 gal/A of Alanap on soil free of weeds when plants are ready to vine. Do not use when weather is cold and wet.

Insect Control

Aphids:

[7] Diazinon 0.5 lb actual/A = 1 pint AG 500 or

[0] Endosulfan (Thiodan) 0.5 to 1 lb actual/A = 1 to 2 qt 2 EC or

[14] Meta-Systox-R 0.5 lb actual/A = 2 pints 2 E.

Aphids are mainly a problem during July and August. Do not use Meta-Systox-R more than twice during the season.

Striped Cucumber Beetle:

[0] Carbaryl (Sevin) 1 lb actual/A = 2 lb 50 WP or

[0] Endosulfan (Thiodan) 0.5 to 1 lb actual/A = 1 to 2 qt 2 EC or

[1] Methoxychlor 1 to 1.5 lb actual/A = 2 to 3 lb 50% WP.

To prevent bacterial wilt which is transmitted by the striped cucumber beetle, it is essential to start sprays as soon as plants crack the soil or immediately after transplanting. Repeat application every 5 to 7 days until plants start to vine. Carbaryl may be phytotoxic on young plants.

Mites:

[2] Kelthane 0.5 lb actual/A = 1.5 lb 35 WP or

[14] Meta-Systox R 0.5 lb actual/A = 2 pints 2 E.

Mites are sometimes a problem late in the season. Treat only when necessary.

Disease Control

Damping-off:

Use fungicide-treated seed.

Bacterial wilt:

Control cucumber beetles before they feed on plants.

Cucumber mosaic virus (CMV) and watermelon mosaic virus (WMV):

For CMV, use resistant varieties such as Marketmore 70, Meridian, Belle Aire, and SMR 58; Gemini, SMR 18, and Pioneer are fairly resistant. For control of WMV, and of CMV on susceptible varieties, it may help to: (a) kill perennial weeds (virus source plants) within 150 feet of plantings, and (b) control aphids (virus carriers).

Scab:

Grow scab resistant varieties such as Gemini, Marketomore 70, Meridian, Belle Aire, SMR 18, SMR 58, and Pioneer. For susceptible varieties: (a) Use well-drained soil that was not planted to cucumber, muskmelon, pumpkin, or squash for two or more years. (b) A spray program started when plants are at the 2-leaf stage may help; try [0] Bravo (? pints 6F/A) or [5] zinc ion-maneb (2 lb 80% WP/A) at 5- to 7-day intervals.

Anthracnose, alternaria leaf spot, downy mildew:

For anthracnose, practice a 3-year rotation. Spray at 7-day intervals with

Number in [ ] refers to minimum days between last application and harvest

[0] Bravo (2 pints 6F/A), or [0] Difolatan (3 pints 4F/A), or [5] zinc ion-maneb (2 lb 80% WP/A).

Angular leaf spot:
Practice a 3-year rotation. At first sign of disease, add [0] Kocide (1.5 to 2 lb 86% SP/A) or [0] fixed copper (applied at manufacturer's direction) with anthracnose sprays. Copper sprays used alone can reduce yield.

Powdery mildew:
When possible, grow tolerant varieties such as Gemini, Belle Aire, and Pioneer. Avoid introducing powdery mildew to fields on transplants. Whenever possible, do not start late plantings near established plantings with disease. When disease appears, spray at 7- to 10- day intervals with [7] Karathane (0.5 lb 18.25% WD/100 gal; use 100 to 150 gal/A) or alternate Karathane sprays with [0] Benlate (0.25 to 0.50 lb 50% WP/A). Do not make more than four applications of Karathane to any one set of fruit. Bravo, used for other diseases, will help reduce powdery mildew severity.

EGGPLANT

Seed Treatment

Use seed soaked in water at 122°F for 25 minutes. Seed should be dried and treated with thiram 75% WP as a dust (5.3 oz/100 lb = 1 tsp/lb) or as a slurry (4 oz /100 lb = 0.8 tsp/lb).

Weed Control

Post-planting:
DCPA (Dacthal) at 6 to 10.5 lb active/A. Apply 8 to 14 lb of Dacthal 75% WP in at least 40 gal water/A. Confine application to a period of 4-6 weeks after transplanting. Can be sprayed directly over well-established transplants. Soil should be weed-free prior to application. See other remarks for DCPA under Cabbage, Pre-emergence (seedbeds).

Insect Control

Aphids:
[7] Demeton (Systox) 0.25 to 0.375 lb actual/A = 0.33 to 0.5 pint 6E/A.
[1] Endosulfan (Thiodan) 0.5 lb actual /A = 1 qt 2 E or
[3] Malathion 0.5 lb actual/A = 1 pint of 57% EL or
[7] Meta-Systox-R 0.5 lb actual/A = 1 qt 2 E.
Start treatment when aphid population begins building up in early July. Do not use demeton more than twice per season or Meta-Systox-R more than three times.

Colorado Potato Beetle and Flea Beetles:
[0] Carbaryl (Sevin) 1 lb actual/A = 1.25 lb 80 S.

Flea Beetles:
Guthion 0.5 lb actual/A = 1 qt 2 L. Highly toxic.
Keep watch on plants after transplanting and apply when needed. Guthion is not registered for Colorado potato beetle. Do not use Guthion after fruits start to set.

Disease Control

Damping-off:
Use seed treated with thiram. Start seedlings in a sterile mix or sterilized soil. Spray with captan (7 lb 50% WP/1000 sq ft = 7.5 tsp/100 sq ft) as soon as seeds germinate and repeat at 10-day intervals.

Verticillium wilt:
Plant in fields that are not heavily contaminated with Verticillium. Where Verticillium is a problem: (a) follow a 4-to 5-year rotation with crops other than tomatoes, potatoes, peppers, strawberries, or any of the brambles, or (b) grow plants in plastic-covered rows fumigated with Vorlex (30 gal/A), Vapam (60 gal/A), or chloropicrin. Black Jack F1 Hybrid is claimed to have wilt tolerance.

Anthracnose and Phomopsis fruit rots:
Follow a 4-year rotation. Use hot water- and fungicide-treated seed. Spray with [0] maneb (2lb 80%/100 gal) or [0] zineb (2 lb 75% WP/100 gal); start as first fruits ripen and continue at 10-day intervals.

LETTUCE

Seed Treatment

Dust seed with thiram (5.3 oz 75% WP/ 100 lb of seed = 1 tsp/lb).

Number in [ ] refers to minimum days between last application and harvest

Weed Control

See table listing chemicals with label clearance.

Insect Control

Aphids:
[10] Diazinon 0.5 lb actual/A = 1 pint AG 500 or
[7,14] Dimethoate (Cygon, Defend) 0.25 lb actual/A - 0.75 pint 2.67 E. or
[7,14] Malathion 1.25 lb actual/A = 2 pints 57% EC.
Aphids are usually not a serious problem on spring lettuce but the fall crop should be watched closely.

Cabbage Looper:
[0] Biotrol XK 1 to 2 lb WP/A or
[0] Dipel 0.5 to 1 lb WP/A or
[0] Thuricide HPC 1 to 2 qt/A or
[7,10] Methomyl (Lannate, Nudrin) 0.45 to 0.9 Actual/A = 1 to 2 qts 1.8 L. Do not use methomyl closer than 7 days to harvest at 0.5 pound rate or 10 days at rates above 0.5 pound.

Leafhoppers:
[3,14] Carbaryl (Sevin 1 lb actual/A = 1.25 lb 80 S or
[7,14] Dimethoate (Cygon, Defend) 0.25 lb actual/A = 0.75 pint 2.67 E.
Mainly a problem on the fall crop. Begin spraying when first leafhoppers are seen on the plants. Three to four applications at 5-day intervals may be needed or
Di-Syston 15% granules. 4 to 8 oz/1000 ft of row = 6.7 to 13.3 lb/A. or
Phorate (Thimet) 15% granules. 4 oz/1000 ft of row = 6.7 lb/A.
Apply Di-Syston as a side dressing at time of seed planting only. Phorate may be used as a side dressing at seed planting or when transplanting. Both materials are highly toxic. Di-Syston should also be effective against aphids.

Disease Control

Damping-off:
In the seedbed, use an artificial growing medium, or soil that is steamed or chemically fumigated (see p. 2,3). Where soil is used, drench with ferbam (1 lb 76% WP/100 gal water = 3 tsp/gal) when plants emerge and at 10- to 14-day intervals; use 5 gal/100 sq ft of seedbed. Keep relative humidity down by ventilation and light watering

Botrytis gray mold:
[14] Botran sprays (2.6 lb 75% WP/A) can be used on greenhouse leaf lettuce (applied 7 days after transplanting and again when plants are half mature), and on field head lettuce (applied several days after thinning when plants have recovered, and again in 7- to 10-days). In seedbeds, water early in the day and do not crowd plants.

Rhizoctonia bottom rot, and Sclerotinia drop (field):
Practice a 4-year rotation. Use well-drained soil; plant on beds if possible. Disease incidence is increased by cultivating loose soil against stems and leaves. No currently registered fungicide is very effective against these diseases.
For drop control, [14] Botran (1 lb 75% WP/100 gal; do not exceed 2.6 lb/A) may help when applied just before cultivation. Two applications, separated by a 7- to 10-day interval, are allowed.

Yellows:
Control leafhoppers (vectors) with insecticides.

Mosaic:
Use mosaic tested (MT) seeds. Control aphids (virus carriers) in uncultivated border areas around fields.

MUSKMELON AND WATERMELON

Seed Treatment

Seed should be dusted with captan (3 oz 50% WP/100 lb = 0.6 tsp/lb).

Weed Control

Pre-emergence:
Naptalam, sodium salt, (Alanap) at 4 to 6 lb active/A. Apply 2 to 3 gal/A of Alanap. See remarks for naptalam under CUCUMBER, Pre-emergence.

Pre-plant and Pre-emergence:
Bensulide (Prefar) at 6 lb active/A plus Naptalam, sodium salt, (Alanap) at 2 to 4 lb active/A. Apply a tank-mix combination of 1.5 gal Prefar plus 1 to 2 gal Alanap in 20 to 40 gal water/A. See other remarks for bensulide plus naptalam mixture under CUCUMBER.

Weeds between black plastic mulch:
Naptalam, sodium salt, (Alanap) at 4 lb active/A. Treat the spaces between the plastic with 2 gal/A of Alanap as soon as possible after laying it. Transplant

either before or after spraying for weed prevention. However, if transplanting is done first, adjust equipment so chemical does not get on plants.

Post-emergence:
DCPA (Dacthal) at 6 to 10.5 lb active/A. Apply 8 to 14 lb of Dacthal 75% WP in at least 40 gal water/A to the soil 4 to 6 weeks after seeding. When weeds have emerged, crops should be cultivated or weeded prior to application. Irrigate if no rain within 3 days after application. Ragweed, smartweed, and galinsoga are not effectively controlled.

Post-emergence or Post-transplanting:
Naptalam, sodium salt, (Alanap) at 2 to 4 lb active/A. Apply 1 to 2 gal/A of Alanap. See remarks for naptalam under CUCUMBER, Post-emergence.

Insect Control

See Cucumber section for insect control.

Disease Control

Damping-off:
Use fungicide treated seed. Grow transplants in soil-free artificial mix or in a steamed or fumigated soil mix (see pp. 2,3).

Bacterial wilt:
Control cucumber beetles before they feed on plants.

Cucumber mosaic virus (CMV) and watermelon mosaic virus (WMV):
It may help to: (a) kill perennial weeds (virus source plants) within 150 feet of plantings, and (b) control aphids (virus carriers).

Alternaria leaf spot, downy mildew and anthracnose:
Practice a 3-year rotation for anthracnose. Spray at 7-day intervals with [0] Bravo (2 pints 6F/A), or [5] zinc ion-maneb (2 lb 80% WP/A), or [0] Difolatan (3 pints 4F/A).

Scab of muskmelon:
Use well-drained soil that was not planted to cucumber, muskmelon, pumpkin, or squash for 2 or more years. Fungicides used for Alternaria leaf spot may help; fungicides may be ineffective when minimum temperatures of less than 57°F persist longer than 9 hours.

Powdery mildew of muskmelon:
Saticoy Hybrid is tolerant to mildew. Avoid introducing mildew to fields via transplants. Whenever possible, do not start late plantings near established plantings with disease. If disease appears, spray at 7- to 10-day intervals with [7] Karathane (0.5 lb 18.25% WD/100 gal; use 100 to 150 gal/A) or alternate Karathane sprays with [0] Benlate (0.25 to 0.5 lb 50 WP/A). Bravo used for other diseases will help reduce powdery mildew severity.

Fusarium wilt of muskmelon:
Practice long rotations in which muskmelons are not grown. Saticoy Hybrid, Harper Hybrid, Classic and Delicious 51 are thought to have some resistance.

Fusarium wilt of watermelon:
Practice long rotations in which watermelons are not grown. Grow resistant varieties such as Crimson Sweet, Jubilee, Charleston Gray, Seedless Hybrid 313, Sweet Princess, Summer Festival, Top Yield, Petite Sweet, and You-Sweet-Thing.

ONION

Seed Treatment

Where smut is a problem, pellet seed with captan (1.5 to 2 lb 50% WP/lb seed) or thiram (10.7 oz 75% WP/lb seed) or treat soil at planting time. Where smut is not a problem, dust seed with thiram (4 oz 75% WP/100 lb = 0.8 tsp/lb) for damping-off control.

Weed Control (For Direct Seeding)

Pre-emergence:
Chloropropham (Chloro IPC) at 4 to 6 lb active/A. Apply 1 gal/A of Chloro IPC in 40 gal water/A. Use 1.5 gal rate when temperature is above 60°F.

Post-emergence:
Chloropropham (Chloro IPC) at 2 to 4 lb active/A. Apply 0.5 to 1 gal/A of Chloro IPC when onions are in "loop" stage. Do not apply in "flag" stage or within 1 month of harvest.

Number in [ ] refers to minimum days between last application and harvest

Weed Control (For Sets)

Pre-emergence:

Chloropropham (Chloro IPC) at 4 to 6 lb active/A. Apply 1 gal Chloro IPC in 40 gal water/A. Cover sets completely with soil when planting and apply the same day. Use 1.5 gal rate when temperature is above 60°F.

DCPA (Dacthal) at 6 to 10.5 lb active/A. Apply 8 to 14 lb of Dacthal 75% WP in at least 40 gal water/A immediately after planting. See other remarks for DCPA under CABBAGE, Pre-emergence (seedbeds).

Weed Control (For Transplants)

Post-transplanting:

DCPA (Dacthal) at 6 to 10.5 lb active/A. Apply 8 to 14 lb/A of Dacthal 75% WP at transplanting or at layby (last row cultivation). Crop should be weed-free prior to application. Can be sprayed directly over transplants. See other remarks for DCPA under Cabbage, Pre-emergence (seedbeds).

Insect Control

Onion Maggot:

In-furrow planting treatment:

Dasanit - 3.7 oz 15% G/1000 ft of row. Apply granules in seed furrow at planting. Do not use on green bunch onions. or

Diazinon - use 1 qt of AG 500 per acre in sufficient water to drench the seed furrow at planting time.

Post-planting spray treatment.

[3] Malathion 1.5 lb actual/A = 2.5 pints 57 EL. Start applications about time forsythia is in full bloom. Make three applications at weekly intervals. Spray directly over the row and soak soil around base of plants.

Thrips:

[7 or 28] Guthion 0.5 to 0.75 lb actual /A = 2 to 3 pints 2L. Do not apply Guthion more than 3 times per season. or

[3] Malathion 1 lb actual/A = 1 to 1.5 pints 57% EL.

Disease Control

Smut:

Either (a) use fungicide-pelleted seed, or (b) apply a solution of nabam (2.1 lb = 4 qt 22% LC/A = 29,000 linear ft of row; in sufficient water for adequate distribution) or formaldehyde (1 gal 37% LC in 65 gal water and applied at the rate of 100 gal/37,300 linear ft or row) as a furrow drench at seeding. Later treatments are not necessary because seedlings and onion sets are immune.

Downy mildew, purple blotch, and Botrytis leaf blight (blast);

Practice a 2-year or longer rotation. Avoid windbreaks; use well-drained soil. Begin spraying overwintered onions after mid-April whenever warm, wet weather occurs. Dry-bulb onion sprays should begin early in June. Use [0] maneb (1.5 lb 80% WP/A), or [7] zinc ion-maneb (3 lb 80% WP/A); include a spreader-sticker. Do not use zinc ion-maneb on green-bunching onions.

Botrytis neck rot:

Control leaf diseases (see above). Use cultural practices which promote early maturity. Undercut and windrow onions until inside neck tissue is dry; then top and store. If necessary, dry in artificial heat (90 to 120°F for 2 to 3 days). Discard thick-necked bulbs. Store where dry and cool (32 to 34°F).

PARSLEY

Seed Treatment

Use seed dusted with chloranil 15.5 oz/100 lb seed.

Weed Control

Post-emergence:

Petroleum Solvents -- These include various herbicidal oils, of which Stoddard Solvent has been widely used. Apply 75 to 100 gal/A of Petroleum Solvents after true leaves have formed (2- to 4- leaf stage) but not later than 6 weeks before harvest. Spray when weeds are not more than 2 inches high. Plants may be damaged after they reach a height of 6 inches. Does not control ragweed.

Disease Control

Damping-off:

Follow a 4-year rotation.

PARSNIP

Weed Control

Pre-emergence:

Linuron (Lorox) at 0.75 to 1.5 to active /A. Apply 1.5 to 3 lb of Lorox 50% WP in 25 to 40 gal water/A after seeding. Sow seed at least 0.5 inch deep. Use the lower rate on lighter soils, or crop injury may

result.

Post-emergence:

Petroleum Solvents--These include various herbicidal oils, of which Stoddard Solvent or dry cleaning fluids are widely used. Apply 75 to 100 gal/A of Petroleum Solvents after true leaves have formed (2- to 4-leaf stage) but not later than 6 weeks before harvest. Spray when weeds are not more than 2 inches high. Does not control ragweed.

Insect Control

Leafhoppers:

[3] Carbaryl (Sevin) 1 lb actual/A = 2 lb 50 WP or 1.25 lb 80 S. Begin sprays about June 15 and continue at 10 to 14 day intervals until mid-August.

Disease Control

Leaf spot and root canker:

Practice a 2-year rotation. Use well-drained soil. Lime to pH 7. Ridge soil over shoulders.

Root knot nematodes:

Fumigate upland soil with D-D (20 gal/A), or ethylene dibromide (4.5 to 6 gal 83% liquid/A) or Telone (16 gal/A), or Vorlex (12 gal/A). Fall treatment is best. Allow 14 to 21 days before plantings. Do not use ethylene dibromide where onions will be planted within 3 years.

PEAS

Seed Treatment

Use seed treated with thiram 75% WP or Dexon 35% WP (2oz/100 lb = 4 tsp/10 lb; dry or slurry), or with Ortho 65 (captan plus graphite, at manufacturer's directed rates).

Weed Control

Pre-emergence:

Dinoseb, amine salt, (Premerge) at 6 to 9 lb active/A. Highly toxic. Apply 2 to 3 gal of Premerge in 20 or more gal water/A. Apply as an overall spray at time of seeding. Heavier rates have label clearance and under certain conditions may be beneficial.

Post-emergence:

Dinoseb, amine salt, (Premerge) at .75 to 2.25 lb active/A. Highly toxic. Apply 1 to 3 qt of Premerge in 20 or more gal water/A. Apply when peas are 4 to 6 inches tall and the weeds are small. Do not spray after flower buds are visible. After 1 or more days of cloudy weather, allow 1 day of sunlight to allow crop plants to harden before spraying dinoseb. Ideal application time is when temperatures are between 70° and 85°F. As temperatures rise, reduce the rates. (See label for specific recommendations.) Do not graze treated areas or feed treated vines to livestock within 40 days after treatment.

MCPB (Can-Trol or Thistrol) at 0.75 lb active/A. Apply 3 pints/A of either Can-Trol or Thistrol when thistles have good shoot emergence and broadleaf weeds are less than 3 inches high. Do not apply after pea flower buds appear. Do not spray peas under moisture stress or when temperatures are over 90°F. Do not graze treated pea fields or feed treated vines to livestock.

Insect Control

Pea Aphid:

[0] Diazinon 0.25 lb actual/A = 0.5 lb 4E WP or

[0] Dimethoate (Cygon, Defend) 0.125 lb actual/A = 0.5 pint 2.67 E or

[3] Malathion 1 lb actual/A = 1.5 pints 57 EL. Most fields usually do not have serious problems from pea aphids.

Seed Maggots:

See section on Seed Treatment (Page 2).

Disease Control

Root rot:

Follow a 4- or 5-year rotation. Use fungicide-treated seed. Plant as early as possible in well-drained and well-fertilized soil. Do not double-crop with beans.

Fusarium wilt:

Practice a 5- or 6-year rotation when possible. Plant resistant varieties such as Progress No. 9, Frosty, Lincoln, Perfested Freezer 60, and Mammoth Melting Sugar.

Number in [ ] refers to minimum days between last application and harvest

Viruses:

Use resistant varieties when possible. Perfected Freezer 60 is resistant to pea enation mosaic. Do not grow susceptible varieties near clover where viruses may overwinter. Aphid control may help.

PEPPER

Seed Treatment

Dust seed with thiram (5.5 oz 75% WP/100 lb = 1 tsp/lb) or captan (4.5 oz 50% WP/100 lb = 0.8 tsp/lb).

Weed Control

Pre-transplanting:

Trifluralin (Treflan) at 0.5 to 1 lb active/A. Apply 1 to 2 pints/A of Treflan. See other remarks for trifluralin under DRY BEANS.

Post-planting:

Diphenamid (Dymid or Enide) at 4 to 5 lb active/A. Apply either 5 to 6 lb/A of Dymid 80% WP or 8 to 10 lb/A of Enide 50% WP. Apply immediately after transplanting or within 1 month after transplanting. See other remarks for diphenamid under TOMATO, Weed Control (for Direct-Seeded).

Insect Control

Aphids:

[0] Dimethoate (Cygon, Defend) 0.33 lb actual/A = 1 pint 2.67 E or

[1] Endosulfan (Thiodan) 0.5 lb actual/A = 2 pints 2 EC. or

[0] Meta-Systox-R 0.5 lb actual/A = 1 qt 2 E. Do not apply Meta-Systox-R more than twice per season. or

[10] Methomyl (Lannate, Nudrin) 0.45 lb actual/A = 2 pints 1.8 L.

Aphid populations start building up on the undersides of the leaves in July. Begin spraying when aphid populations are still low. 2 or 3 sprays at 5 to 7 day intervals may be needed.

Colorado Potato Beetle and Flea Beetles:

[0] Carbaryl (Sevin) 1.0 lb actual/A = 1.25 lb 80 S.

Flea Beetles:

[3] Guthion 0.5 lb actual/A = 1 qt 2 L. Beetles may appear soon after transplanting. Spray only as needed. Guthion is not registered for Colorado potato beetle.

European Corn Borer:

[0] Carbaryl (Sevin) 1.5 lb actual/A = 2 lb 80 S. or

[3] Guthion 0.5 lb actual/A = 2 pints 2L.

This is usually a very destructive pest because the larvae of the second generation enter the fruits. 3 or 4 spray applications at 5 to 7 day intervals may be needed. Begin applications in early August.

Disease Control

Damping-off:

Use fungicide-treated seed. Grow transplants in a synthetic soil-free mix, in steamed soil, or in soil fumigated with chloropicrin, or methyl bromide, or Vapam, or Vorlex (see pp.2,3). Treat flats of seedlings and transplants with captan (2 lb 50% WP/100 gal = 6 tsp/gal). Make applications after seeds germinate, and again after transplanting to flats; for added protection, repeat at 10-day intervals. Use enough liquid to wet the plants and run down the stems; use about 1 gal/100 sq ft. Stop greenhouse sprays when temperatures rise above 90°F.

Bacterial leaf spot:

Follow a 1-year rotation in seedbeds and fields. Use only certified plants. In the seedbed, streptomycin sprays (manufacturer's directions) can be used as protective or curative treatments. In the field, [0] Kocide (2 lb 86% SP/A) or [0] fixed copper (manufacturer's direction) will help reduce spread where disease incidence is low and sprays are started early.

Viruses:

Mechanically transmitted TMV can be controlled by using resistant varieties such as S addon's Select, Pennbell, Midway, and Yolo Wonder (A and L types). Aphid transmitted viruses cannot be controlled adequately with insecticides although disease occurrence can be delayed by their use. Growers may wish to use yellow pans containing water (aphid traps) to determine when aphids are most prevalent; repeated contact aphicide applications would be most beneficial at that time.

PUMPKIN AND SQUASH

Seed Treatment

Seed should be treated with captan 50% WP or thiram 75% WP (3 oz/100 lb = 0.6 tsp/lb).

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Weed Control

Pre-emergence:
Chloramben (Amiben) at 3 to 4 lb active /A. Apply 1.5 to 2 gal/A of either liquid Amiben or 30 to 40 lb/A of 10% granular Amiben at seeding time or immediately after. On lighter soils use the lighter rates. Band applications over the row will reduce costs.

Dinoseb, amine salt, (Premerge) at 3 to 6 lb active/A. Highly toxic. At seeding, band-treat 1 to 2 gal/A of Premerge over the row. See other remarks for dinoseb under CUCUMBER.

Insect Control

See Cucumber section for control of aphids, striped cucumber beetles, and mites.

Melonworm and Pickleworm:
[0] Carbaryl (Sevin) 0.5 to 1.0 lb actual/A = 0.67 to 1.25 lb 80 S or
[0] Endosulfan (Thiodan) 0.5 to 1.0 lb actual/A = 1 to 2 qt 2E.
Fruits of summer squash are a favored host for the larvae of these two species. Injury from these insects was very low in 1974. Past damage has been confined to the southern half of the state.

Squash Vine Borer:
Use carbaryl (Sevin), endosulfan (Thiodan), or methoxychlor at dosage rates suggested for striped cucumber beetle. Begin control when plants vine and direct spray to base of plants. 2 or 3 applications at 7-day intervals will probably be needed.

Disease Control

Damping-off:
Use fungicide-treated seed.

Bacterial wilt:
Control cucumber beetles before they feed on plants.

Cucumber mosaic virus (CMV and watermelon mosaic virus (WMV):
For early season summer squash, pumpkin, and winter squash, it may help to (a) kill perennial weeds (virus source plants) within 150 feet of plantings, and (b) control aphids (virus vectors). Grow late season summer squash on aluminum foil.

Powdery mildew:
Avoid introducing mildew to fields via transplants. Try to keep late plantings away from established plantings. If disease appears, spray at 7- to 10-day intervals with [7] Karathane (0.5 lb 18.25% WD/100 gal; use 100 to 150 gal/A) or on squash, with [7] Karathane alternated with [0] Benlate (0.25 to 0.5 lb 50% WP/A). Bravo used for other diseases also will reduce powdery mildew severity.

Black rot:
Practice a 3-year rotation. Pumpkin varieties that appear to be least severely affected include Small Sugar, Spookie, Jack-O-Lantern, Young's Beauty, Thomas Halloween, and Howdens Field. If pumpkin or winter squash is to be stored, apply [0] Bravo (2 to 3 pints 6F/A) in mid-August and then at 7- to 10-day intervals for 3 or 4 sprays. Harvest before a frost; handle carefully to avoid injury. Cure by storing at 75 to 85°F for 2 weeks; then store at 50 to 55°F.

RADISH

Root Maggot:
Diazinon 2.0 lb actual/A = 4 lb in 100 gal of water/A. Apply (1 to 1.33 gal of water per 1000 linear feet of row) in the seed furrow at planting time.

SPINACH

Seed Treatment

Where downy mildew is a problem, and seed is suspected as the major initial source of the disease-causing fungus, soak seed in 122°F water for 25 minutes; dry at room temperature and then treat with a fungicide.

Use seed treated with thiram as a dust or as a slurry (5.5 oz 75% WP/100 lb = 1 tsp/lb), or with captan as a dust (9 oz 50% WP/100 lb = 1.8 tsp/lb or as a slurry (3.6 to 6 oz 50% WP/100 lb or 1 tsp/lb).

Weed Control

Pre-seeding:
Cycloate (Ro-Neet) at 3 lb active/A. Apply 4 pints/A of Ro-Neet and incorporate with top 2 to 3 inches of soil immediately. Apply only to well-worked seedbed.

Number in [ ] refers to minimum days between last application and harvest

Pre-emergence:
CDEC (Vegadex) at 4 lb active/A. Apply 1 gal Vegadex in 20 to 40 gal water/A immediately after seeding. Moisture is needed within 2 or 3 days for satisfactory weed control.

Chloropropham (Chloro IPC) at 1 to 2 lb active/A. Apply 1 to 2 qt of Chloro IPC in 40 gal water/A. For minimum injury to crop, apply the day of planting. Use 2-qt rate when temperature is above 60°F and 1-qt rate below 60°F. Use with caution on sandy soils or soils low in organic matter.

Insect Control

Aphids and Leaf Miners:
[10] Diazinon 0.25 lb actual/A = 0.5 pint AG 500 or
[14] Dimethoate (Cygon and Defend) 0.25 lb actual/A = 0.75 pint 2.67 E.
A preventative spray program against leaf miners is suggested. Begin treatments when plants have 4 leaves and repeat at weekly intervals.

Di-Syston 1 lb actual/A = 4 oz of 15 G per 1,000 feet of row. Place the granules in a band on each side of the seed furrow at planting time only. Do not apply directly on the seed.

Aphids are mainly a serious problem on the fall crop. Di-Syston is not registered for leaf miner control.

Disease Control

Damping-off:
Use fungicide-treated seed. Apply captan as a preplant soil treatment or as a furrow treatment: (a) Soil treatment — Apply spray (4 to 12 lb 50% WP/A) or dust (20 to 60 lb 10% D/A) and work into upper 3 to 4 inches of soil with a rake or a rototiller. (b) Furrow treatment — Apply at planting time into the seed furrow as a spray (5 to 7 lb 50% WP in 25 to 30 gal water/A) or as a dust (25 to 35 lb 10% D/A) before covering.

Blue mold (downy mildew):
Practice a 3-year rotation. When possible, use resistant varieties such as Hybrid 612, Early Hybrid No. 7, and Chesapeake. Hot water-treated seed may help. Plant in well-drained soil and do not crowd plants. Do not plant early spring spinach near winter spinach. Spray with [10] maneb (1.5 lb 80% WP/A) or [10] zineb (2 lb 75% WP/100 gal) at 7- to 10-day intervals during wet, cool weather. Remove excess maneb residue by washing. Plow under crop refuse as soon as crop is harvested.

Blight (CMV):
For fall crops, use resistant varieties such as Virginia Savoy, Chesapeake, and Early Hybrid No. 7.

SWEET CORN

Seed Treatment

Use seed treated with: (a) captan as a dust (3.0 to 3.8 oz 50% WP/100 lb or 7.5 tsp/10 lb) or as a slurry (1.6 to 4 oz 50% WP/100 lb or 6 tsp/10 lb), or (b) thiram as a dust (2 oz 75% WP/100 lb = 4 tsp/10 lb) or as a slurry (3.3 to 5.3 oz 75% WP/100 lb or 8 tsp/10 lb), or Vitavax 200 (4 oz/100 lb).

Weed Control

Fall treatment to control quackgrass:
Dalapon (Dowpon M or Basfapon B) at 8.5 to 12.75 active/A. Apply 10 to 15 lb /A of Basfapon B or Dowpon M on land to be planted to sweet corn the following spring. Apply during September to actively growing quackgrass. Plow down in 10 to 20 days or delay plowing until spring. Follow with atrazine pre-emergence or post-emergence.

Pre-seeding:
Butylate (Sutan+) at 3 to 4 lb active/A plus Atrazine (AAtrex) at 1 lb active/A. Apply a tank-mix combination containing 3.75 to 4.75 of Sutan+ 6.7-E with 1.25 lb/A AAtrex 80% WP. Apply and incorporate into soil immediately after spraying. Corn can be planted immediately after treatment. Good for nutsedge (nutgrass), annual grasses and broadleaves. Chop-up and turn under existing stands of nutsedge before treating.

Pre-emergence:
2,4-D (amine) at 1 lb/A. Apply 1 lb/A or 1 qt of Formula 40 just before corn emerges. Hazardous on light sandy soils. See PRECAUTIONS on page 2.

Simazine (Princep 80 W only) at 2 lb active/A. Apply 2.5 lb/A of Princep 80 W immediately after seeding. Heavier rates have label clearance and under certain conditions may be beneficial. However, do

not apply more than 4 lb active to corn in any one year. Do not graze treated area. Suggest working the soil thoroughly before seeding cover crop. Do not plant vegetables the year following simazine application, or injury will occur.

Atrazine (AAtrex) at 2 lb active/A. Apply 2.5 lb/A of AAtrex 80W or 2 qt AAtrex 4L as a band or overall treatment during planting. When applied in a band over the seed row, adjust the rate for the particular band width. Fall plow. Throughly till the soil before seeding cover crop to minimize possible injury to rotational spring-seeded crops, regardless of the rate used. Residues may remain in the soil for over 1 year, especially with atrazine rates over 2 lb active per acre. If atrazine is applied after June 10, do not rotate with crops other than corn or sorghum the next year, or injury may occur. Do not graze or feed forage to livestock for 21 days after treatment.

Cyanazine (Bladex) at 2 to 3.2 lb active/A. Apply 2.5 to 4 lb/A of Bladex 80% WP in 15 to 30 gal water/A. Apply after planting and before corn emerges. Because of low residue its use might be considered where atrazine residue has been a problem. Use higher rates on heavier soils or on earlier plantings. Weak on pigweed. Effective on fall panicum.

Note: Post-emergence use of Bladex on sweet corn is not recommended at this time.

Atrazine (AAtrex) at 1 lb plus Alachlor (Lasso) at 1.5 lb active/A. As a tank-mix use 1.25 lb AAtrex 80% WP or 1 qt AAtrex 4L plus 1.5 qt Lasso in 15 to 30 gal water/A. Apply at planting time or before weeds emerge. Excellent control of annual grasses, including fall panicum, on low organic matter soils.

Post-emergence:

Atrazine (AAtrex) at 2 lb active/A. Apply 2.5 lb/A of AAtrex 80% WP or 2 qt AAtrex 4L as a directed spray before weeds are more than 1.5 inches tall but not later than 3 weeks after planting. Where lower rates are desirable add suitable petroleum oil with an emulsifier to increase grass control. Where nutsedge (nutgrass) is a problem use dosage rates up to 4 lb active and after nutsedge is 6 inches tall. Do not cultivate before weeds turn yellow. Residues may remain in the soil for over 1 year, especially with rates over 2 lb per acre. See other precautions and remarks for atrazine under Pre-emergence.

2,4-D (amine) at 0.25 to 0.5 lb active/A. Spray 0.5 to 1 pint of Formula 40 when corn emerges until it is 6 inches tall. Use drop pipes after it has reached 12 inches in height. Don't treat corn in tassel. Delay cultivation for 8 to 10 days after treatment to overcome any temporary brittleness. Hybrids vary in tolerance to 2,4-D -- some are easily injured. Consult your seed company representative. See PRECAUTIONS on page 2.

Insect Control

Corn Earworm:

[0] Carbaryl (Sevin) 1.6 actual/A = 2 lb 80 S or

[0] Diazinon 1 to 1.25 lb actual/A =2 to 2.5 pints AG 500 or

[0] Methomyl (Lannate, Nudrin) 0.25 to 0.5 lb actual/A = 1 to 2 pints 1.8 L.

[12] Penncap M (Micro-Encapsulated Methyl Parathion) 1 lb actual/A = 4 pints of the 2 lb/gal formulation. Do not use screens or nozzles finer than 50 mesh.

Greatest earworm pressure is on corn harvested in late August and September. Start control when 15 to 20% of ears are in silk. It may be necessary to treat at 2 to 3 day intervals.

Corn Leaf Aphid:

[5] Malathion 1.0 lb actual/A = 1.5 pints 57 EL.

Aphids often appear on newly emerged tassels in late June and July. Treatment may be necessary if 25% of tassels are heavily infested before pollination is completed.

Corn Rootworms:

Bux granules 1.0 lb actual/A = 10 lb 10 G or

Dasanit granules 1.0 lb actual/A = 6.7 lb 15 G or

Dyfonate granules 1.0 lb actual/A = 10 lb 10 G or

Thimet granules 1.0 lb actual/A = 6.7 lb 15 G.

Treatment is needed only on fields that were in either sweet or field corn the previous two years and where the adult

Number in [ ] refers to minimum days between last application and harvest

beetles were prevalent last August and September. Apply any of the materials in a 6-inch band over the row at planting.

European Corn Borer:

[0] Carbaryl (Sevin) 1.6 lb actual/A = 2 lb 80 S or

[0] Methomyl (Lannate, Nudrin) 0.5 lb actual/A = 2 pints 1.8 L.

For early corn apply sprays when tassel can be seen in the whorl. First generation moths appear during most of June; may need 2 to 4 applications at 5-day intervals. or

Diazinon granules 1 to 2 lb actual/A = 7 to 14 pounds 14G. For first generation borers apply when 75% of plants show borers feeding. Granules should be applied over the tops of the plants so they will sift into the whorl and leaf axils. A second application 7 days later may be needed.

Cutworms:

[0] Carbaryl (Sevin) 2 lb actual/A = 4 lb 50% WP or 2.5 lb 80 S or 2 qt Sevimol 4. Use specified amount in at least 15 gallons of water and spray a 12-inch band over the row.

Flea Beetles:

[0] Carbaryl (Sevin) 1 to 2 lb actual/A = 2 to 4 lb 50% WP/A or 1.25 to 2.5 lb 80S/A. Flea beetles transmit bacterial wilt disease. Treat at spike stage. Two to five applications may be necessary on susceptible varieties. On resistant varieties sprays may not be needed.

Sap Beetles:

[0] Diazinon 1 to 1.25 lb actual/A = 2 to 2.5 pints AG 500 or

[5] Malathion 1.0 lb actual/A = 1.5 pints 57% EL. Make spray applications when needed.

Seed Corn Maggot:

See section on Seed Treatment (page 2).

Disease Control

Stewart's bacterial wilt:

This disease is usually a problem following winters when the average temperatures for December, January, and February add up to a value over 90. Consult your county agent for this information. In seasons when disease is expected (a) control corn flea beetles which spread the disease organism, or (b) use resistant varieties such as: Northern Belle (second early); Gold Cup, NK 199, Bellringer, Apache, and Valley Market (main season); Sweet Sue (bicolor); and Silver Queen, Moonglow, and Comet (white). Susceptible varieties include Sugar and Gold , Butter Sweet, Jubilee, Tendersweet, Silver Beauty and Gold Star.

Smut:

When practical, remove and destroy smut balls before they break. Practice long rotations. Reduce plant injury by controlling corn borers as first tassels appear and by using care during cultivation. Large late varieties are reported to be more tolerant than small early varieties.

Yellow leaf blight:

Practice a 3-year rotation and plow under corn debris in the fall. Hybrids on N cytoplasm are more likely to have resistance than hybrids on T cytoplasm.

Southern corn leaf blight:

Rotate corn with other crops. Use N hybrids. Although fungicide spraying seldom is economically feasible, [7] zinc ion-maneb (1.5 lb 80% WP/A) is effective when applied as first symptoms appear and then at 4- to 7-day intervals.

Maize dwarf mosaic virus (MDMV):

Where MDMV is a problem in late plantings, Gold Crown, Bravo, Seneca Star, and Earlibelle should be grown on a trial basis. Also control perennial weed hosts and maintain strict aphid control.

SWEET POTATO

Weed Control

Post-transplanting:

DCPA (Dacthal) at 6 to 10.5 lb active/A. Apply 8 to 14 lb/A of Dacthal 75% WP at time of planting up to 6 weeks after transplanting. Crop should be weed-free prior to application. See other remarks for DCPA (Dacthal) under CABBAGE, Pre-emergence (seedbeds).

Diphenamid (Dymid or Enide) at 4 to 6 lb active/A. Apply either 5 to 7.5 lb/A of Dymid 80% WP or 8 to 12 lb/A of Enide 50% WP. Apply over top of transplants after they are established. Do not plant crops not on the label to treated areas within 6 months of treatment.

Insect Control

Flea Beetle:

[0] Endosulfan (Thiodan) 0.5 lb actual/A = 2 pints 2 EC. Check for flea beetles soon after transplanting and spray only when needed.

Do not feed sweet potatoes treated with endosulfan to livestock.

Disease Control

In Plant Beds

Use only new or sterilized sand and a bed temperature of 80 to 85°F. Plant only sound roots.

In the Field

Black rot and scurf:

Practice a 3-year rotation on sandy loam soil or a 4-year rotation on heavier soil. Use disease-free transplants. Dip "seed" roots for 1 to 2 minutes in a warm solution of Mertect (8 fl oz of 42.28% F in 7.5 gal water); plant immediately. No additional sprout treatment is needed; however, discard infected sprouts.

Pox:

Rotate with other crops. Maintain a pH between 4.8 and 5.2. Use resistant varieties when possible; Nemagold has intermediate resistance. Use disease-free transplants.

Storage soft rot (Rhizopus):

Dig roots before wet, cold weather. Avoid wounding roots during digging and handling. Transfer promptly from field to storage. Maintain proper temperature and relative humidity (RH) during curing (80 to 85°F and 90% RH for 6 to 8 days) and storage (55°F and 85% RH). Dip or spray harvested potatoes with Botran (1.5 lb 50% WP/100 gal) after cleaning and before packaging.

TOMATOES (FIELD)

Seed Treatment

Use seed treated first with hot water (122°F for 25 minutes), and then with thiram as a dust (5.3 oz 75% WP/100 lb = 1 tsp/lb) or as a slurry (3.4 to 4 oz 75% WP/100 lb or 0.8 tsp/lb).

Weed Control (For Transplants)

Pre-transplanting:

Pebulate (Tillam)at 4 to 6 lb active/A. Apply either 0.67 to 1 gal of Tillam 6E/A or 40 to 60 lb of Tillam 10-G/A. Incorporate to a depth of 2 to 3 inches immediately after application. Apply only to well-worked soil. Use lighter rates on sandy soils and up to 1 gal on heavy soils. Where nutsedge (nutgrass) is a problem Tillam is recommended.

Trifluralin (Treflan) at 0.5 to 1 lb active/A. Apply 1 to 2 pints of Treflan/A. Use lighter rates on sandy soils and up to 1 qt on heavy soils. Incorporate with the top 2 to 4 inches of soil. Incorporation may be delayed 4 to 8 hours. Slight stunting may result if weather is cool and damp.

Diphenamid (Dymid or Enide) at 4 to 6 lb active/A. Apply either 5 to 7.5 lb of Dymid 80% WP or 8 to 12 lb Enide 50% WP/A at planting. Incorporate into soil with shallow disking or harrowing. Diphenamid is subject to leaching. Use lighter rates on lighter soils. Breakdown of the residue is faster in years of adequate rainfall. Small grain or grass cover crops sown within 6 months after date of treatment may be injured.

Post-transplanting:

Diphenamid (Dymid or Enide) at 4 to 6 lb active/A. Apply either 5 to 7.5 lb Dymid 80% WP or 8 to 12 lb Enide 50% WP/A. Apply immediately or within 4 weeks after transplanting to weed-free soil. See other remarks for diphenamid under TOMATO, Pre-transplanting.

Pebulate (Tillam) at 4 lb active/A. Apply either 0.67 gal/A of Tillam 6E as a directed spray to the soil or broadcast 40 lb Tillam 10-G/A when plants are dry. Incorporate to a depth of 2 to 3 inches immediately after application. Do not apply within 8 days of harvest.

Weed Control (For Direct Seeding)

Diphenamid (Dymid or Enide) may be used in any combination of "Pre-seeding" or "Pre-emergence" or "Post-emergence" applications providing the total amount does not exceed 6 lb active per acre, and is applied anytime from direct seed-

Number in [ ] refers to minimum days between last application and harvest

ing to 1 month after seeding. If diphenamid is applied in a band over the seed row, adjust the rate for the particular band width. Small grain or grass cover crops sown within 6 months after date of treatment may be injured.

Pre-seeding soil incorporation:

Diphenamid (Dymid or Enide) at 4 to 6 lb active/A. Apply either 5 to 7.5 lb/A of Dymid 80% WP or 8 to 12 lb/A Enide 50% WP. Incorporate into the soil at the time the field is prepared for seeding or at the time the beds are shaped. Depth of incorporation should be 0.5 to 2 inches. Use 15 to 30 gal water/A. Incorporation beyond these depths, however, will dilute the chemical in the soil and may result in poor weed control.

or

Pre-emergence:

Diphenamid (Dymid or Enide) at 4 to 6 lb active/A in 30 gal water/A immediately after seeding. If necessary, shallow cultivation (0.5 to 2 inches) may improve its effectiveness.

or

Post-emergence:

Diphenamid (Dymid or Enide) at 4 to 6 lb active/A in 30 gal water/A. Apply to weed-free soil within 4 weeks after seeding crop.

Layby (last cultivation):

Pebulate (Tillam) at 4 lb active/A. Apply either 0.67 gal/A of Tillam 6E as a directed spray to the soil or broadcast 40 lb Tillam 10-G/A when plants are dry. Incorporate to a depth of 2 to 3 inches immediately after application. Do not apply within 8 days of harvest. Do not apply Tillam pre-seeding, pre-emergence, or early post-emergence on direct-seeded tomatoes.

Insect Control

Aphids:

[1] Diazinon 0.25 lb actual/A = 0.5 pint AG 500 or

[7] Dimethoate (Cygon, Defend) 0.33 lb actual/A = 1 pint 2.67 E or

[1] Malathion 0.6 lb actual/A = 1 pint 57 EC or

[1] Methomyl (Lannate, Nudrin) 0.45 lb actual/A = 2 pints 1.8 L.

Pink and green aphids will frequently be noticed in small numbers in June, but treatment is not necessary until populations start building up on the plants.

Green peach aphid may become a problem during July and August.

Cutworms:

Pre-plant field treatment - Diazinon 2 to 4 lb actual/A. Broadcast spray 2 to 4 qt of AG 500 in a minimum of 5 gal water/A just prior to planting. Work into the top few inches of soil immediately. Diazinon granules can be used in place of the spray.

Post-plant treatment - Carbaryl (Sevin 2 lb actual/A = 2.5 lb 80S. Use as spray and thoroughly wet soil at base of plants. May injure tender plants. or

Carbaryl (5% Sevin bait) 40 lb of commercially prepared bait per acre. Apply to the soil around base of plants only if needed.

Colorado potato beetle:

[0] Carbaryl (Sevin) 0.5 to 1.0 lb actual/A 0.67 to 1.25 lb 80 S or

[0] Guthion 6 oz/A = 0.75 lb 50% WP.

Carbaryl and emulsifiable concentrates may injury tender plants.

Flea beetle:

[0] Carbaryl (Sevin) 0.5 to 1.0 lb actual/A = 0.67 to 1.25 lb 80 S or

[0] Guthion 0.5 to 0.75 lb actual/A = 2 to 3 pints 2 L or

[1] Methoxychlor 1.5 lb actual/A = 3 lb 50% WP.

Hornworms:

[0] Carbaryl (Sevin) 1.0 to 2.0 lb actual/A = 1.25 to 2.5 lb 80 S. or

[1, 14] Guthion 0.75 to 1.5 lb actual/A = 1.5 to 3 lb 50 WP.

Use higher dosage rates if worms are large and populations are heavy. Use only when necessary.

Fruit Flies:

[0] Diazinon granules 1.0 lb actual/A = 7 lb of 14 G or

[1] Diazinon spray 0.75 lb actual/A = 1.5 lb 50 WP.

Start field application when first fruits ripen. Treat at weekly intervals until harvest is complete. Granules are preferred to sprays.

For protection of fruits in containers use 0.1% pyrethrin dust at the rate of 1 lb of dust per ton of fruit.

Disease Control

Damping-off:

Use fungicide treated seed and plant in

a soil-free mix or in a soil that has been steamed or fumigated (see pp 2,3). A pre-plant soil treatment with captan may be helpful. Use 4 to 5 oz 50% WP/100 sq ft (applied as a dust or a spray); work into the top 3 to 4 inches of soil before planting.

Bacterial wilt and bacterial canker:
Use hot water-treated seed or certified plants. Practice a 2- or 3-year rotation where bacterial canker has been present.

Bacterial spot:
Practice a 2-year rotation. Use hot water-treated seed or certified plants. If spot appears early, spray with [0] Kocide (2 lb 86% SP/A).

Fusarium and Verticillium wilts:
For Fusarium, practice a 3- or 4-year rotation. For Verticillium, practice as long a rotation as possible in which susceptible plants such as potatoes, peppers, eggplants, strawberries, and raspberries are avoided. Grow varieties resistant to: (a) both Fusarium and Verticillium — Springset, Spring Giant, Jet Star, Burpee's VF, Heinz 1350, Campbell 1327, Supersonic, Vineripe VFN, Monte Carlo, Hybrid 980, Ramapo, Super Red, Small Fry (cherry), and Roma VF (pear); (b) Fusarium only--Homestead 24, Homestead 500, Sunray, and Chico III (pear); and (c) Verticillium only — New Yorker.

Anthracnose, early blight, late blight, and leaf spots:
For anthracnose, early blight, and some leaf spots, use hot water-treated seed and practice a 2- or 3-year rotation. For late blight, use disease-free transplants and avoid planting next to potatoes.

Spray with [0] Bravo (2 to 3 pints 6F/A), or [0] Difolatan 4F (2.5 to 5 pints/A; machine harvest only), or [5] maneb (3 lb 80% WP/100 gal), or [5] zinc ion-maneb (3 lb 80% WP/A), or Dyrene (5 lb 50% WP/A), or [5] Polyram (3 lb 80% WP/100 to 150 gal/A). Begin when crown fruit is first visible; continue at 7- to 10-day intervals depending on weather.

A "2-application" spray program is suggested for trial use on mechanically harvested tomatoes planned for early harvest. Use Difolatan 4F (1 to 2 gal/A) when crown fruit are one-third to one-half their final size; repeat once 20 days later. If late blight appears, resume the standard spray program for anthracnose and blights.

Fruit rot control on processing tomatoes:
Usually, fruit rot is more prevalent on processing tomatoes than on fresh market tomatoes. This is because many processing tomatoes are over-ripe when they are picked. The following methods will help reduce these fruit rot problems: (a) Follow fruit rot control recommendations listed above. (b) Harvest fruit as early in the season as possible, before cool wet fall weather. (c) When possible, grow fruit rot tolerant varieties such as Potomac, Chico III, VF-134, and Red Rock. (d) Use fungicides at the highest rates and shortest intervals noted on labels; a strict fungicide spray program is particularly important on rot susceptible varieties planned for late-season harvest. (e) Use of Ethrel may reduce rot losses. Losses are reduced when fruit ripens earlier and therefore is picked earlier than fruit in similar plantings not treated with Ethrel.

Blossom-end rot:
Avoid moisture stress by means such as irrigating soil when dry, and by avoiding cultivation close to plants.

Blotchy ripening:
Select varieties that are least affected under your local conditions. Heinz 1350 and Vendor are reported to show some tolerance.

TOMATOES (GREENHOUSE)

Seed Treatment

Use seed treated first with hot water (122°F for 25 minutes) and then with thiram as a dust (5.3 oz 75% WP/100 lb = 1 tsp/lb) or as a slurry (3.4 to 4 oz 75% WP/100 lb or 0.8 tsp/lb).

Insect Control

Aphids, Mites:
[1] Dibrom - use 5 ounces of 8 EC per 50,000 cu ft. Dispense from hotplate. or
[1] Vapona 10% aerosol. Use 1 lb per 50,000 cu ft.
For aphids only:
[15 hr] Thiodan 10% aerosol. Use 1 lb per 50,000 cu ft or
[1] Thiodan spray using 1 lb or 50% WP per 100 gal of water

Follow all directions and precautions when using aerosols.

Number in [ ] refers to minimum days between last application and harvest

Whitefly:

Calcium cyanide fumigation. This offers the most effective control now known. IMPORTANT: Follow label directions for use Cyanide is highly toxic--follow precautions.

Disease Control

Fusarium and Verticillium wilts:

Grow plants in a soil-free mix or in soil that has been steamed or fumigated (see pp. 2,3) Fusarium resistant plants include the pink varieties Ohio W-R 25, Ohio W-R 29, and Ohio W-R 7, and the red varieties Michigan-Ohio Hybrid, Super-M, Tuckcross 520, and Vendor.

Botrytis gray mold and Cladosporium leaf mold:

Regulate heating and ventilation to keep relative humidity below 90% at all times. When this cannot be maintained, use [0] Exotherm Termil (3.5 oz/1000 sq ft floor area) or [0] Termil (1 tablet/400 sq ft floor area); if disease becomes established, repeat application every 7 to 10 days.

Mosaic:

(a) Reduce initial source of TMV: Eliminate weeds (particularly horse nettle and ground cherry) in and around greenhouses. Use steamed soil (180°F for 30 minutes, check coolest area with a thermometer) or a soil-free mix. Use new containers or old containers that were steamed or heated in water (180°F for 30 minutes). Avoid smoking when working with tomatoes. (b) Reduce spread: Remove early infected plants. Wash hands with soap and water, dip hands in a skim milk (powdered) solution before working with healthy plants. (c) Try new resistant pink varieties Ohio M-R 9 and Ohio M-R 12. Vendor is a resistant red variety for fall crops in some areas.

TURNIP

Seed Treatment

Use hot water-treated seed (122°F for 25 minutes) dusted with thiram (5.3 oz 75% WP/100 lb = 1 tsp/lb).

Weed Control

Pre-emergence:

DCPA (Dacthal) at 6 to 10.5 lb active/A. Apply 8 to 14 lb/A of Dacthal 75% WP. Apply in bands over the row at time of seeding. See other remarks for DCPA under CABBAGE, Pre-emergence (seedbeds).

Insect Control

Flea Beetles:

[3,14] Carbaryl (Sevin) 0.5 to 1 lb actual/A = 0.66 to 1.25 lb 80 S. or

[14] Methoxychlor 1 lb actual/A = 2 lb 50 WP.

[10] Diazinon 0.5 actual/A = 1 pint AG 500/A or 1 lb 50% WP/A.

Start treatment when leaves show first sign of feeding. Repeat application as needed.

Aphids, Leafhoppers:

[14] Dimethoate (Cygon) 0.25 lb actual/A = 0.75 pint 2.67 EC/A.

Root Maggots:

Diazinon granules--Apply 14 to 28 lb of 14G/A broadcast just prior to planting. Thoroughly mix into top 3 to 4 inches of soil.

Disease Control

Clubroot:

Where field soil is not infested, avoid introducing the disease organism in transplants or on machinery. Where field soil is infested, avoid these fields and practice a 7-year rotation. If this is not possible, some control is obtained by either adjusting pH of field soil to 7.2 or using at least 1500 lb/A of hydrated lime in the spring.

Blackleg and Black-rot:

Destroy or plow under all crucifer refuse. Practice a 3-year (black-rot) or a 4-year (blackleg) rotation. Use hot water-treated seed.

Downy mildew and anthracnose:

Practice a crop rotation. Destroy mustard weeds Avoid windbreaks and select well-drained fields. Use hot water-treated seed. If disease appears, spray with [7] maneb (3 lb 80% WP/A).

Mosaic viruses:

Destroy perennial crucifer weeds (e.g., horseradish) along fence rows, roadways, and ditch banks, and in fallow ground adjoining turnip fields. Avoid growing successive crucifer crops in adjacent fields during the season. Sprays to control aphids (virus vectors) may help. Prevent volunteer turnip growth by disking fields in the fall, leaving unharvested turnips on the soil surface during winter, and destroying or removing volunteer turnips in the spring. Purple Top White Globe is reported to be more tolerant to certain viruses than are the Japanese hybrids.

HERBICIDES AND FORMULATIONS RECOMMENDED FOR COMMERCIAL VEGETABLE CROPS

Common Name	Trade Name	Lowest Storage Temperature[1]	Nature of Commercial Product	Pounds or Percent Active Ingredient in Commercial Product
Alachlor	Lasso	33°F	Liquid-EC[4]	4 lb per gal
Atrazine	AAtrex 4L	--	Liquid-FL[5]	4 lb per gal
	AAtrex 80W	--	WP[2]	80 percent
Bensulide	Prefar	40°F	Liquid-EC[4]	4 lb per gal
Butylate	Sutan+	None	Liquid-EC[4]	6.7 lb per gal
	Sutan	--	Granular	10 percent
CDEC	Vegadex	0°F	Liquid-EC[4]	4 lb per gal
Chloramben	Amiben	32°F	Liquid-SC[6]	2 lb per gal
		--	Granular	10 percent
Chloroxuron	Tenoran	--	WP[2]	50 percent
	Norex			
Chlorpropham	Chloro IPC	-1.°F	Liquid-EC[4]	4 lb per gal
Cyanazine	Bladex	--	WP[2]	80 percent
Cycloate	Ro-Neet	20°F	Liquid-EC[4]	6 lb per gal
Dalapon	Dowpon M	--	SP[3]	85 percent
	Basfapon B			
DCPA	Dacthal	--	WP[2]	75 percent
Dinoseb (amine salt)	Premerge	0°F	Liquid-SC[6]	3.0 lb per gal
Diphenamid	Dymid	--	WP[2]	80 percent
	Enide	--	WP[2]	50 percent
Diuron	Karmex	--	WP[2]	80 percent
EPTC	Eptam	None	Liquid-EC[4]	7 lb per gal
Linuron	Lorox	--	WP[2]	50 percent
MCPB	Thistrol	32°F	Liquid-SC[6]	2 lb per gal
	Can-Trol			
Naptalam (sodium salt)	Alanap	32°F	Liquid	2 lb per gal
Nitrofen	TOK WP-50	--	WP[2]	50 percent
Pebulate	Tillam	None	Liquid-EC[4]	6 lb per gal
Petroleum Solvents		0°F	Liquid	100 percent
Pyrazon	Pyramin RB	--	WP[2]	80 percent
Simazine	Princep 80W	--	WP[2]	80 percent
Trifluralin	Treflan	40°F	Liquid-EC[4]	4 lb per gal
2,4-D (amine salt)	Formula 40	32°F	Liquid-SC[6]	4 lb per gal
(sodium salt)	-------	----	SP[3]	80.5 percent

[1]Lowest storage temperature for liquid chemicals. [2]Wettable Powder
[3]Soluble Powder [4]Emulsifiable Concentrate [5]Flowable [6]Soluble Concentrate

HERBICIDES, CROP CLEARANCE, AND WEEDS CONTROLLED

This part of the guide is designed as a helpful list of herbicides available for use on vegetables. Listed are the most widely used herbicides that have label clearance registered by the Environmental Protection Agency, Pesticides Regulation Division. Before using, refer to all directions and be sure to read and understand the warning statements on each label.

Omission of certain herbicides or trade names either unintentionally or from lack of available information should not be considered to be endorsing only the materials listed. Also, because of the limited space, the weeds considered to be of major importance in Pennsylvania are the only ones listed. Standardized names of weeds are used in accordance with the Subcommittee on Standardization of Common and Botanical Names of Weeds (Weeds 14: 246-386, 1966).

Common Names Trade Name	Crops with Label Clearance	Important Weeds Controlled
Alachlor Lasso (liquid or granular)	Sweet corn	Barnyardgrass, crabgrass, fall panicum, foxtails, goosegrass, witchgrass, carpetweed, pigweed, and purslane.
Ametryn Evik 80W	Sweet corn and popcorn (postemergence, directed spray only)	Barnyardgrass, crabgrass, fall panicum, foxtails, goosegrass, annual morningglory, cocklebur, lambsquarters, pigweed, ragweed, smartweed, velvetleaf, wild mustard, and nutsedge (nutgrass).
Atrazine AAtrex 4L AAtrex 80W	Sweet corn and popcorn	Barnyardgrass, foxtails, large (hairy) crabgrass, volunteer oats, witchgrass, annual morningglory, galinsoga, lambsquarters, mustard, nightshade, pigweed, purslane, ragweed, smartweed, and velvetleaf.
Benefin Balan	Direct-seeded lettuce	Annual bluegrass, barnyardgrass, crabgrasses, foxtails, goosegrass, johnsongrass (from seed), ryegrass, sandbur, carpetweed, chickweed, knotweed, lambsquarters, pigweed, and purslane.
Bensulide Prefar	Broccoli, Brussels sprouts, cauliflower, cucumbers, lettuce, melons, squash, and tomatoes	Barnyardgrass, crabgrass, fall panicum, foxtails, and goosegrass.
Butylate Sutan+ 6.7-E Sutan 10-G	Sweet corn	Barnyardgrass, crabgrass, fall panicum, field sandbur, foxtails, goosegrass, johnsongrass (from seed), and nutsedge (nutgrasss).
Butylate/Atrazine Sutan/Atrazine 18-6G (also, see TANK MIX, p. 36)	Sweet corn	All weeds listed separately under Butylate plus annula morningglory, carpetweed, cocklebur, jimsonweed, lambsquarters, mustards, nightshade, pigweeds, purslane, ragweed, smartweed, and velvetleaf.
CDAA + TCBC Randox - T	Sweet corn and popcorn	Annual bluegrass, barnyardgrass, crabgrass, foxtails, carpetweed, cocklebur, lambsquarters, mustards, pigweed, purslane, ragweed, sandbur, smartweed, and velvetleaf.
CDEC Vegadex (liquid or granular)	Lima beans, snap beans, broccoli, Brussels sprouts, cabbage, cantaloupes (muskmelons), cauliflower, celery (transplant), chicory, collard, cucumbers, endive, escarole, Hanover salad, kale, lettuce, mustard greens, okra, spinach (except muckgrown), sweet corn, tomato, turnips, and watermelons.	Annual bluegrass, barnyardgrass, crabgrass, foxtails, goosegrass, chickweed, henbit, pigweed, and purslane. Considered more effective on broadleaves than grasses.

Common Names Trade Name	Crops with Label Clearance	Important Weeds Controlled
Chloramben Amiben (liquid)	Seedling asparagus, dry beans, lima beans, pumpkins, squash, and sweet potatoes	Barnyardgrass, crabgrass, fall panicum, foxtails, goosegrass, johnsongrass (from seed), stinkgrass, black nightshade, carpetweed, chickweed, lambsquarters, pigweeds, purslane, ragweed, smartweed, velvetleaf, wild mustard.
Amiben (granular)	Same as Amiben (liquid) plus peppers and tomatoes	See weeds listed under Amiben (liquid).
Vegiben 2 E (methyl ester, liquid only)	Snap beans; also direct-seeded cantaloupes and cucumbers	Same as Amiben, except no barnyardgrass control.
Chloroxuron Norex	Carrots	Annual morningglory, black nightshade, carpetweed, chickweed, cocklebur, groundsel, jimsonweed, lambsquarters, pigweed, purslane, ragweed, shepherdspurse, smartweed, velvetleaf, and wild mustard.
Tenoran	. . . . .	Same as Norex plus annual bluegrass, barnyardgrass, crabgrass, goosegrass, stinkgrass.
Chlorpropham Chloro IPC (liquid only)	Lima beans, snap beans, carrots, garlic, onions (seeded or sets), peas, and spinach.	Annual bluegrass, barnyardgrass, crabgrass, downy bromegrass, foxtails, ryegrass, witchgrass, carpetweed, chickweed, dodder, knotweed, purslane, red sorrel, smartweed, and wild buckwheat.
Cyanazine Bladex (WP or granular)	Sweet corn and popcorn	Annual bluegrass, annual ryegrass, crabgrass, fall panicum, foxtails, goosegrass, johnsongrass (from seed), stinkgrass, witchgrass, annual morningglory, carpetweed, cocklebur, common chickweed, curlydock (seedling), dogfennel (mayweed), galinsoga, ragweed, shepherdspurse, smartweed, velvetleaf, wild buckwheat, wild mustard, and wild radish.
Bladex 4 WDS	Sweet corn and popcorn (Labeled for pre-emergence uses only)	
Cycloate Ro-Neet 6-E	Table beets and spinach	Annual bluegrass, annual ryegrass, barnyardgrass, crabgrass, foxtails, black nightshade, henbit, lambsquarters, pigweed, purslane, sheperdspurse, and nutsedge (nutgrass).
Dalapon Dowpon M Basfapon B	Asparagus, peas and sweet corn. Also preplant followed by spring plowing on dry, lima, and snap beans, and sweet corn.	Annual grasses such as barnyardgrass, crabgrass, foxtails and panicums. Perennial grasses such as bermudagrass, bluegrass, johnsongrass and quackgrass. Will not control broadleaf weeds.
DCPA Dacthal	Dry beans, snap beans, broccoli, Brussels sprouts, cabbage, cantaloupes, cauliflower, collards, cucumbers, eggplant, garlic, kale, mung beans, mustard greens, onions, peppers, squash (summer and winter), sweet corn, sweet potatoes, tomatoes, turnip (greens and roots), and watermelons	Crabgrasses, green foxtail, yellow foxtail, stinkgrass, witchgrass, carpetweed, common chickweed, lambsquarters, and purslane. Only partially effective on annual bluegrass, barnyardgrass, dodder, goosegrass, johnsongrass (from seed), pigweed, and sandbur.

Common Names Trade Name	Crops with Label Clearance	Important Weeds Controlled
Dinoseb Premerge	Dry beans, lima beans snap beans, cucumbers, peas, popcorn, pumpkins, squash, and sweet corn.	Effective on many annual grasses and broadleaved weeds, such as common chickweed, crabgrass, foxtails, common ragweed, lambsquarters, mustards, nightshades, pigweeds, purslane, and smartweed.
Diphenamid Dymid Enide	Okra (Enide only), peppers, sweet potatoes, and tomatoes	Annual bluegrass, annual ryegrass, barnyardgrass, cheat, crabgrass, fall panicum, foxtails, goosegrass, johnsongrass (from seed) sandbur, stinkgrass, witchgrass, carpetweed, common chickweed, knotweed, lambsquarters, pepperweed (peppergrass), pigweed, purslane, and shepherdspurse.
Diuron Karmex	Asparagus	Annual bluegrass, annual ryegrass, barnyardgrass, crabgrass, foxtails, johnsongrass (from seed), orchardgrass (from seed), sandbur, stinkgrass (lovegrass), velvetgrass (from seed), annual morningglory, cocklebur, common chickweed, common ragweed, common sowthistle, dog fennel (mayweed), groundsel, horseweed, pepperweed (peppergrass), pigweed, pokeweed, purslane, shepherdspurse, smartweed, velvetleaf, wild lettuce, wild mustard, and wild radish. Partial control of quackgrass and horsenettle at higher rates per acre.
EPTC Eptam 7-E	Dry beans, snap beans, and sweet corn	Annual bluegrass, annual ryegrass, barnyardgrass, crabgrass, fall panicum, foxtails, goosegrass, johnsongrass (from seed), sandbur, stinkgrass (lovegrass), volunteer grain (barley, oats, wheat), annual morningglory, black nightshade, carpetweed, common chickweed, henbit, lambsquarters, pigweed, purslane, shepherdspurse, nutsedge (nutgrass), and quackgrass.
EPTC Eptam 10-G (granular)	Dry beans and snap beans	See weeds listed under Eptam 7-E, except fall panicum, carpetweed, and shepherdspurse.
EPTC + R-25788 Eradicane 6.7-E	Sweet corn	See weeds listed under Eptam 7-E.
Knoxweed 10-4G (granular)	Sweet corn	Barnyardgrass, crabgrass, foxtails, johnsongrass (from seed), annual morningglory, lambsquarters, pigweed, purslane, ragweed, and velvetleaf.
Linuron Lorox	Carrots and parsnips. Also cleared for sweet corn, but not recommended for this crop on mineral soils.	Pre-emergence use—barnyardgrass, crabgrass, fall panicum, foxtails, goosegrass, carpetweed, common chickweed, galinsoga, lambsquarters, mustard, pigweed, purslane, ragweed, smartweed, and wild radish. Treatment usually provides partial control of annual morningglory, cocklebur, and velvetleaf. Post-emergence use—same as pre-emergence plus annual morningglory, annual ryegrass, cocklebur, dog fennel, groundsel, and wild buckwheat; but no wild radish or galinsoga control.
MCPA Weedar MCPA concentrate	Peas	Many broadleaf weeds including burdock, cocklebur, mustards, pigweed, purslane, ragweed, shepherdspurse, dandelion, plantain, and thistles.

Common Names Trade Name	Crops with Label Clearance	Important Weeds Controlled
MCPA (sodium salt) Weedar Sodium MCPA	Peas	Broadleaf weeds include cocklebur, lambsquarters, mustard (annual), pepperweed (peppergrass), purslane, ragweed, wild radish, and yellow rocket.
MCPB Thistrol Can-Trol	Peas	Canada Thistle and other broadleaf weeds such as annual morningglory, lambsquarters, pigweed, smartweed, and sow thistle.
Naptalam sodium salt Alanap (liquid)	Cantaloupes (muskmelon), cucumbers, and watermelons	Barnyardgrass, crabgrass, foxtails, goosegrass, johnsongrass (from seed), sandbur, cocklebur, common chickweed, jimsonweed, lambsquarters, mustard, pigweed, purslane, ragweed, and velvetleaf. Will not control emerged weeds.
Nitrofen TOK E-25	Broccoli, Brussels sprouts, cabbage, carrots, cauliflower, celery, horseradish, onions, and parsley	Annual bluegrass, crabgrass, goosegrass, groundsel, lambsquarters, nightshade, pigweed, purslane, and shepherdspurse.
Nitrofen TOK WP-50	Broccoli, Brussels sprouts, cabbage, cauliflower, horseradish, and onions	See weeds listed under TOK E-25
Paraquat	Seedling asparagus, lettuce, melons, peppers, tomatoes, and sweet corn	Emerged annual broadleaf weeds and grasses and for top-kill and suppression of perennials.
Pebulate Tillam 6-E Tillam 10-G	Tomatoes	Barnyardgrass, crabgrass, foxtails, henbit, lambsquarters, pigweeds, purslane and nutsedge (nutgrass).
Petroleum Solvents	Broccoli, Brussels sprouts, cabbage, carrots, celery, cauliflower, sweet corn, cucumbers, dill, lettuce, melons, onions, parsley, parsnips, peas, and tomatoes	Most weeds in the seedling stage. Will suppress quackgrass, but will <u>not</u> control ragweed.
Phenmedipham Betanal	Table beets	Control of annual weeds such as: foxtails (green and yellow), chickweed, groundcherry (from seed), lambsquarters, mustard, nightshade, prostrate pigweed, purslane, ragweed, shepherdspurse, and wild buckwheat.
Profluralin Tolban 4-E	Dry beans, lima beans, and snap beans. Also chick peas, mung beans, and okra	Barnyardgrass, crabgrass, foxtails, goosegrass, johnsongrass (from seed), lambsquarters, and pigweed.
Pronamide Kerb 50 W.	Lettuce, escarole, and endive.	Annual bluegrass, barnyardgrass, cheat, crabgrass, fall panicum, foxtail, goosegrass, ryegrass, stinkgrass (lovegrass), (volunteer barley, oats, rye, and wheat), annual morningglory, carpetweed, chickweed, henbit, knotweed, lambsquarters, mustards, nightshades, purslane, shepherdspurse, smartweeds, and volunteer tomatoes.

Common Names Trade Name	Crops with Label Clearance	Important Weeds Controlled
Propachlor Ramrod 65	Peas (processing) and sweet corn	Annual ryegrass, barnyardgrass, crabgrass, fall panicum, foxtails, goosegrass, carpetweed, groundsel, lambsquarters, pigweed, purslane, and ragweed.
Pyrazon Pyramin RB	Table beets	Black nightshade, henbit, lambsquarters, pennycress (fanweed), pigweed, purslane, ragweed, shepherdspurse, smartweed, and wild mustard. Control of grass has been variable and it is not recommended. Where annual grasses are a serious problem, Pyramin RB can be used with one of the grass herbicides approved for use on table beets.
Simazine Princep 80W	Asparagus (established), popcorn and sweet corn	Annual bluegrass, annual morningglory, annual ryegrass, barnyardgrass, crabgrass, downy bromegrass, fall panicum, foxtails, goosegrass, witchgrass, carpetweed, common chickweed, henbit, lambsquarters, mustard, nightshade, pepperweed (peppergrass), pigweed, purslane, ragweed, sheperdspurse, smartweed, and wild mustard.
Trifluralin Treflan EC	Dry beans, lima beans, snap beans, broccoli, Brussels sprouts, cabbage, carrots, cauliflower, collards, kale, mustard greens, okra, peas, turnip greens (grown for processing), and transplants of peppers and tomatoes. Also application at blocking and thinning on direct-seeded tomatoes.	Annual bluegrass, barnyardgrass, cheat, crabgrass, downy bromegrass, foxtails, goosegrass, johnsongrass (from seed), sandbur, carpetweed, common chickweed, henbit, knotweed, lambsquarters, pigweeds, and purslane.
Trifluralin Treflan 5-G	Same as Treflan 6E, except no clearance for carrots, collards, kale, mustard greens, peas, and turnip greens.	See weeds listed under Treflan EC.
2,4-D (amine salt) Formula 40 2,4-D (sodium salt)	Asparagus, popcorn and sweet corn	Most annual and biennial broadleaf weeds including annual morningglory, bull thistle, carpetweed, cocklebur, galinsoga, jimsonweed, lambsquarters, mustards, pepperweed, pigweed, ragweed, shepherdspurse, smartweed, velvetleaf, venice mallow, wild carrot, and yellow rocket. Perennial broadleaf weeds such as dandelion, dock, and plantains, are intermediate in susceptibility. See PRECAUTIONS on page 2.

HERBICIDE TANK MIXES WITH LABEL CLEARANCE

Chemical Common Names Trade Name	Crops with Label Clearance	Important Weeds Controlled
Alachlor Lasso PLUS Atrazine AAtres	Sweet corn	All weeds listed separately under Lasso and AAtrex.
Butylate Sutan+ 6.7-E PLUS Atrazine AAtrex	Sweet corn	All weeds listed separately under Sutan+ and AAtrex.
Cyanazine Bladex 80 WP PLUS Atrazine AAtrex	Sweet corn and popcorn	All weeds listed separately under Bladex and AAtrex.
Propachlor Ramrod 65 PLUS Atrazine AAtrex	Sweet corn	All weeds listed separately under Ramrod 65 and AAtrex.
Naptalam (sodium salt) Alanap PLUS Bensulide Prefar 4-E	Cantaloupes (muskmelon), cucumbers, and watermelons	All weeds listed separately under Alanap and Prefar.

INSECTICIDES, CROP CLEARANCE, AND INSECTS CONTROLLED

Common Names Trade Name		
Azinphosmethyl Guthion	Beans, celery, cole crops, cucumbers, eggplant, melons, onions, peppers, spinach, tomatoes	Aphids, Colorado potato beetles, corn borer, flea beetles, leafhoppers, root maggots, thrips.
Bacillus thuringiensis Biotrol XK Dipel Thuricide HPC	Broccoli, cabbage, cauliflower,	Cabbage looper, diamond back moth, imported cabbage worm.
Bux Bux-ten	Sweet corn	Northern corn rootworm.
Carbaryl Sevin	Most vegetables	General insect control except aphids.
Dasanit	Onions (dry bulb), sweet corn	Maggots, corn rootworm.
Demeton Systox	Beans, cole crops, celery, eggplant, lettuce, peas, peppers, tomatoes	Aphids, leafhoppers, thrips.
Diazinon	Most vegetables	General insect control.
Dimethoate Cygon Defend	Beans, broccoli, cabbage, cauliflower, lettuce, peas, peppers, spinach, tomatoes, turnips.	Aphids, leafhoppers, leaf miners mites.
Disulfoton Di-Syston	Beans, cole crops, corn, lettuce peas, spinach, tomatoes	Aphids, leafhoppers.
Dyfonate	Asparagus, beets, sweet corn, onions (bulb), radish, sweet potato, cabbage	Corn rootworm, garden centepede (Symphylan), maggots, wireworms.
Dylox	Beans, Brussels sprouts, cabbage cauliflower, carrots, collands, lettuce, peppers, pumpkins, table beets, tomatoes	General insect control.
Endosulfan	Beans, carrots, celery, cole crops, corn, cucumber, eggplant, lettuce, melons, peas, peppers, pumpkin, spinach, squash	General insect control.
EPN	Beans, corn, tomatoes	European corn borer.
Ethion	Cucumber, eggplant, melons, peppers, squash, tomatoes	Mites.
Fundal	Broccoli, Brussels sprouts, cabbage, cauliflower	Cabbage looper, imported cabbage worm.
Galecron	Same as for Fundal	Same.
Guthion	See azinphosmethyl	
Kelthane	Beans, cantaloupes, cucumbers, eggplant, peppers, pumpkins, squash, tomatoes, watermelons	Mites.
Lannate	See methomyl	
Lindane	Celery, cole crops, spinach	Aphids, leaf miners, root maggots, squash bugs, thrips.
Malathion	Most vegetables	General insect control
Meta-Systox-R	See ozydementonmethyl	

Common Names Trade Name	Crops with Label Clearance	Important Pests Controlled
Methomyl Lannate, Nudrin	Broccoli, Brussels sprouts, cabbage, cauliflower, celery, corn, lettuce (head), tomatoes, peppers	Cabbage looper and worms, corn borer, corn earworm.
Metaldehyde	Most vegetables	Slugs.
Methoxychlor	Most vegetables	General insecticide except for aphids.
Mevinphos Phosdrin	Most vegetables	Aphids, leafhoppers, leaf miners, mites.
Monitor	Broccoli, Brussels sprouts, cabbage, cauliflower	Aphids, cabbage looper and worms.
Naled Dibrom	Most vegetables	Aphids, fruit flies.
Nudrin	See methomyl	
Oxydementonmethyl Meta-Systox-R	Broccoli, Brussels sprouts, cabbage, cantaloupes, eggplant, peppers, cauliflower, corn, cucumbers, melons, pumpkins, squash, turnips	Aphids, mites.
Parathion	Most vegetables	General insect control.
Phorate Thimet	Beans, corn, lettuce, tomatoes	Aphids, corn rootworms, leafhopper, thrips.
Phosdrin	See mevinphos	
Phosphamidon Dimecron	Broccoli, cantaloupes, cauliflower, cucumbers, peppers, tomatoes, watermelons	Aphids.
Proxol	Beans, Brussels sprouts, cabbage, cauliflower, carrots, collands, lettuce, peppers, pumpkins, table beets, tomatoes	General insect control.
Pyrethrins	Most vegetables	Aphids, fruit flies.
Rotenone	Most vegetables	General insect control.
TEPP	Most vegetables	Aphids.
Thiodan	See endosulfan	
Trichlorfon Dylox, Proxol	Beans, Brussels sprouts, cabbage, caulflower, carrots, collands, lettuce, peppers, pumpkins, table beets, tomatoes	General insect control.
Trithion	Most vegetables	Aphids, leaf miners, mites.

FUNGICIDES AND SOIL FUMIGANTS
CROP CLEARANCE, AND DAYS-TO-HARVEST

Fungicides and soil fumigants listed here are those suggested in this guide. The first name listed for each material is the one used in the crop sections. Additional names for some materials are included next; these are chemical names or common names (not capitalized), and trade names or key parts of trade names (capitalized). They are included to help growers identify materials.

Registrations for foliage or soil application are listed by vegetable crop.

Days necessary between final application of foliage fungicides and harvest are indicated in brackets after crops.

Benlate; benomyl ; 50 WP. Foliage - snap and dry beans [14]; lima beans [28]; celery [7]; cucumbers, melons, summer squash, and winter squash [0].

bordeaux; prepared in the spray tank from copper sulfate, hydrated lime, and water. Foliage - asparagus, beans, beets, broccoli and other crucifers, cantaloupes and other cucurbits, carrots, celery, eggplant, peppers, spinach, and tomatoes [0].

Botran; 50 WP, 75 WP. Foliage - snap beans [2]; celery [7] or [28]; greenhouse cucumbers [0]; greenhouse leaf lettuce [14]; field head lettuce [14]; greenhouse rhubarb [3]; greenhouse tomatoes [0]. Soil - garlic and onions, sweet potato.

Bravo; chlorothalonil; 6F. Foliage - snap beans [7]; broccoli, brussels sprouts, cabbage, cauliflower, carrots [0]; celery [7]; fresh market sweet corn [14]; cucumbers, cantaloupe, honeydew, muskmelon, pumpkin, squash, watermelon, tomatoes [0].

captan; Orthocide, Captan; 50 WP, 75 WP, 80 WP, 2.5 D, 5 D, 7.5 D. Foliage - beans, beets, cantaloupes, cucumbers, honeydew melons, pumpkin, summer squash, winter squash, watermelon, carrots, celery [0]; sweet corn [10]; eggplant, lettuce, green and bulb onions, peppers, pimentos, greenhouse rhubarb, spinach, field and greenhouse tomatoes [0]. Soil - beans, beets, broccoli, brussels sprouts, cabbage, cauliflower, kohlrabi, cantaloupes, cucumbers, honeydew melons, pumpkin, summer squash, winter squash, watermelon, sweet corn, kale, collards, mustard, rutabagas, turnips, green and bulb onions, peas, peppers, pimentos, spinach, field and greenhouse tomatoes.

chloranil. Parsley seed treatment.

chloropicrin; Larvacide 100, Picfume; 99 LC. Soil (for soil-fungi and nematodes) all vegetable crops in greenhouse beds, outdoor beds, potting soil, and seed flats (preplanting treatment).

D-D; D-D Soil Fumigant; 100 LC. Soil (for nematodes) - all vegetable crops (pre-planting treatment).

Demosan; chloroneb; 65 WP. Soil - beans.

Dexon; 35 WP. Only for seed treatment.

Difolatan; 39 EC = 4F. Foliage - cantaloupes and other melons, cucumbers, onions, and machine harvested tomatoes [0].

Dyrene; 50 WP. Foliage - cucumbers, melons, pumpkins, squash [0]; celery [0, trim and wash]; garlic, dry or bulb onions, green onions, shallots, tomatoes [0].

ethylene dibromide; Dowfume W-85 LC. Soil (for nematodes) - asparagus, lima beans, broccoli, carrots, cauliflower, sweet corn, cucumbers, eggplant, lettuce, melons, okra, parsnips, peppers, tomatoes, summer squash, sweet potatoes (pre-planting treatment).

Exotherm Termil; chlorothalonil; 3.5 oz (20%) smoke generator. Foliage - greenhouse tomatoes [0].

ferbam; Ferbam, Fermate, Vancide FE-95; 76 WP. Foliage - snap beans [4]; broccoli and cabbage (plant bed only); carrots [0, 7 if tops are eaten]; celery [0, remove residue by stripping, trimming, and washing]; all cucurbits [0]; pepper, (plant bed only); tomatoes, turnips [0]. Soil - lettuce [7].

fixed coppers; COCS, Tri-basic Copper Sulfate, copper oxide; 53 WP, 55 WP, 75 WP. Foliage - many vegetable crops; see specific label.

formaldehyde; 37 LC. Soil - seeded onions, tomato plant beds; vegetable cold frames, hot beds, flats, and greenhouses.

Karathane; 37 EC, 18.25 WD. Foliage - cantaloupes, cucumbers, greenhouse cucumbers, honeydew melons, muskmelons, pumpkins, squash, watermelons [7].

Kocide; cupric hydroxide; 86 SP. Foliage - beans, cantaloupe, honeydew melons, muskmelons, carrots, celery, cucumbers, peppers and tomatoes [0].

maneb; Maneb, Dithane M-22, Manzate, Dithane M-22 Special, Manzate D, Pratt Lawn and Garden Fungicide; 80 WP. Foliage - asparagus (post-harvest on ferns); dry beans [0]; succulent beans [4]; broccoli [3, or wash and trim]; brussels sprouts, cauliflower, and kohlrabi [0]; cabbage [7]; cantaloupe, cassabas, crenshaws, honeydew melons, honey ball melons, muskmelons, persian melons, watermelons [5]; carrots [0]; celery [14 and strip, trim and wash]; collards, kale, mustard greens [10, wash]; turnips [7, wash]; sweet corn [0, do not feed to livestock]; cucumbers [5]; eggplant [0]; endive, lettuce [10, strip and trim or wash]; onions, peppers, pumpkins [0]; spinach [10, wash]; summer and winter squash, greenhouse and field tomatoes [5].

methyl bromide; Dowfume MC-2; 98% gas. Soil (for soil-fungi and nematodes) - plant beds for vegetables, tomatoes (preplant treatment only).

nabam; Dithane D-14, Miller Bam; 22 EC. Foliage - asparagus (post-harvest to ferns); lima beans, snap beans [7]; beets [0, 7 if tops are eaten]; broccoli, brussels sprouts, cabbage, cauliflower [7]; cantaloupes, cucurbits, melons [5], carrots [0, 7 if tops are eaten]; celery [14, wash and strip]; sweet

corn [0, do not feed to livestock]; eggplant [0]; kale, lettuce, mustard greens, spinach [10]; dry or bulb onions, peppers [0]; green onions, swiss chard [7]; tomatoes [5]; turnip [0, 7 if tops are eaten]. Soil - onions.

Ortho 65; captan (plus graphite); 65 D. Pea seed treatment.

Polyram; 80 WP. Foliage - asparagus (post-harvest to ferns); cantaloupes, cucumbers [5]; celery [14; strip, trim, and wash]; sweet corn [1; do not feed to livestock or process corn]; tomatoes [5].

streptomycin; Agri-mycin 17, Agri-Strep Type D; 17 WP, 21.2 WP. Foliage - celery, peppers, tomatoes (in transplant beds only).

sulfur; wettable sulfur, Sulfur; 90 WP. Foliage - artichokes, asparagus, beans, beets, broccoli and other cole crops, carrots, celery, cucumbers and other cucurbits, eggplant, garlic, lettuce, onion, peas, peppers, spinach [0].

Telone; dichloropropene mixtures; 100 LC. Soil (soil-fungi and nematodes) - all vegetable crops (for nematodes only); onions, peanuts, sweet potatoes (preplant treatment only).

Termil; chlorothalonil; 8 gm 90% tablet. Foliage - greenhouse tomatoes [0].

Terraclor; pentachloronitrobenzene (PCNB); 75 WP, 10 D, 20 D, 40 D. Soil - bean broccoli, brussels sprouts, cabbage, cauliflower, garlic, peppers, tomatoes.

thiram, Thiram, Thylate; 65 WP. Foliage - celery [7; strip, trim, and wash]; tomatoes [0]. Soil - dry bulb onions.

Vapam; sodium methyl dithiocarbamate dihydrate; 100 LC. Soil (soil-fungi and nematodes) - all vegetable crops (preplant treatment only).

Vitavax 200; 37.5% Vitavax (carboxin) + 37.5% thiram; 37.5% WP. Seed treatment for sweet corn.

Vorlex; methyl isothiocyanate and chlorinated hydrocarbons; 100 LC. Soil (soil-fungi and nematodes) - all vegetable crops (field and greenhouse soil; preplant treatment only).

zinc ion-maneb; Dithane M-45, Manzate 200; 80 WP. Foliage - asparagus (post-harvest to ferns); carrots [7; do not use tops for food or feed]; celery [14]; pop and sweet corn [7; 40 for livestock feed]; cucumbers, summer squash, melons [5]; dry bulb onions, fennel [7], tomatoes [5].

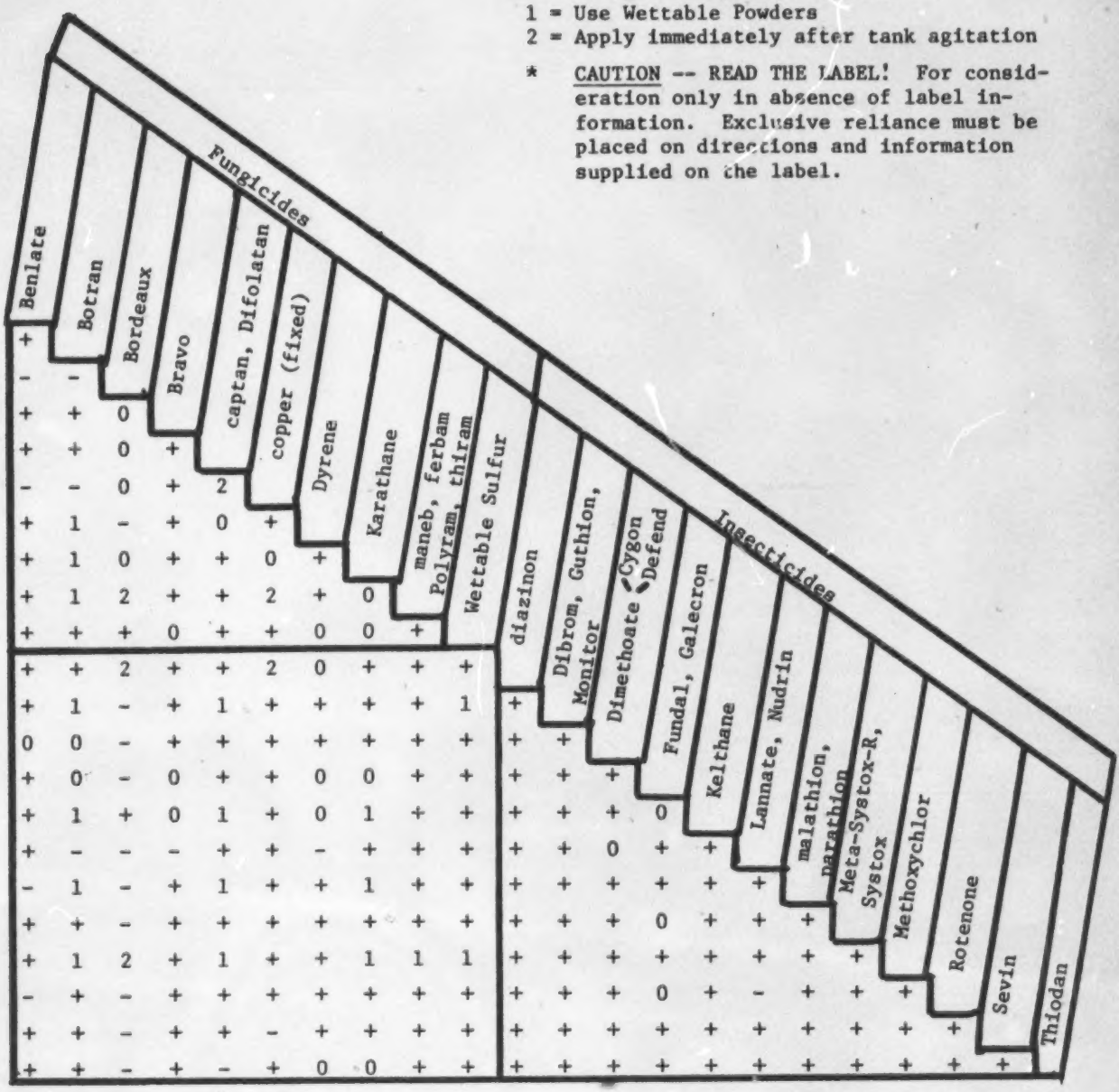
zineb; Zineb, Dithane Z-78; 75 WP, 85 WP. Foliage - asparagus (post-harvest to ferns); beans [7]; beets [0, 7 if tops are eaten]; broccoli, brussels sprouts, cabbage, cauliflower [7], cantaloupe, cassabas, crenshaws, honeydews, honey balls, muskmelons, persian melons, watermelons [5]; carrots [0, 7 if tops are to be eaten]; celery [14]; collards [7]; corn [0; do not use for livestock feed]; cucumber [5]; eggplant [0]; endive, kale [10]; kohlrabi (until edible parts are half grown); lettuce, mustard greens [10]; dry onions [0]; green onions [7]; peas [10]; peppers, pumpkin [0]; summer and winter squash [5]; radish [0]; romaine [10]; spinach [10]; swiss chard [7]; tomatoes [5]; turnips [0, 7 if tops are eaten]. Soil - lettuce, peas, peppers.

FUNGICIDE AND INSECTICIDE COMPATIBILITY CHART*

Key:

+ = Compatable
- = Incompatable
0 = Compatability not known or materials not generally used together
1 = Use Wettable Powders
2 = Apply immediately after tank agitation

* CAUTION -- READ THE LABEL! For consideration only in absence of label information. Exclusive reliance must be placed on directions and information supplied on the label.



FORMULATION NEEDED TO OBTAIN POUNDS ACTIVE PER ACRE

FORMULATION	AMOUNT OF FORMULATION NEEDED TO OBTAIN ACTIVE PER ACRE																	
	0.25	lb	0.5	lb	0.75	lb	1	lb	1.5	lb	2	lb	3	lb	4	lb	5	lb
1% Dust or Granule	25	lb	50	lb	75	lb	100	lb	150	lb	200	lb	300	lb	400	lb	500	lb
4% Dust or Granule	6.25	lb	12.5	lb	18.75	lb	25	lb	37.5	lb	50	lb	75	lb	100	lb	125	lb
5% Dust or Granule	5	lb	10	lb	15	lb	20	lb	30	lb	40	lb	60	lb	80	lb	100	lb
10% Dust or Granule	2.5	lb	5	lb	7.5	lb	10	lb	15	lb	20	lb	30	lb	40	lb	50	lb
14% Granule	1.75	lb	3.5	lb	5.33	lb	7 13	lb	10.75	lb	14.25	lb	21.5	lb	28.5	lb	35.62	lb
20% Granule	1.25	lb	2.5	lb	3.75	lb	5	lb	7.5	lb	10	lb	15	lb	20	lb	25	lb
25% WP	1	lb	2	lb	3	lb	4	lb	6	lb	8	lb	12	lb	16	lb	20	lb
40% WP	0.66	lb	1.25	lb	1.87	lb	2.5	lb	3.75	lb	5	lb	7.5	lb	10	lb	12.5	lb
50% WP	0.5	lb	1	lb	1.5	lb	2	lb	3	lb	4	lb	6	lb	8	lb	10	lb
75% WP	0.33	lb	0.66	lb	1	lb	1.33	lb	2	lb	2.66	lb	4	lb	5.33	lb	6.66	lb
80% WP	--		--		--		1.25	lb	1.87	lb	2.5	lb	3.75	lb	5	lb	6.25	lb
86% WP	--		--		--		1.25	lb	1.75	lb	2.33	lb	3.5	lb	4.66	lb	5.75	lb
10-12% EC																		
1.0 lb actual/gal	1	qt	2	qt	3	qt	1	gal	6	qt	2	gal	3	gal	4	gal	5	gal
15-20% EC																		
1.5 lb actual/gal	0.66	qt	1.33	qt	2	qt	2.66	qt	1	gal	5.33	qt	2	gal	10.66	qt	13.33	qt
25% EC																		
2.0 lb actual/gal	1	pt	2	pt	3	pt	2	qt	3	qt	4	qt	6	qt	8	qt	10	qt
2.67 lb actual/gal	0.75	pt	1.5	pt	2.25	pt	3	pt	2.25	qt	3	qt	4.5	qt	6	qt	7.5	qt
40-50% EC																		
3.0 lb actual/gal	0.66	pt	1.33	pt	2	pt	2.66	pt	2	qt	2.66	qt	4	qt	5.33	qt	6.66	qt
4.0 lb actual/gal	0.5	pt	1	pt	1.5	pt	2	pt	3	pt	2	qt	3	qt	4	qt	5	qt
57% EC																		
5 lb actual/gal	6.5	oz	13	oz	1.25	pt	1.66	pt	2.5	pt	3.33	pt	5	pt	6.66	pt	8.33	pt
60-65% EC																		
6 lb actual/gal	0.33	pt	0.66	pt	1	pt	1.33	pt	2	pt	2.66	pt	4	pt	5.33	pt	6.66	pt
70-75%																		
8 lb actual/gal	0.25	pt	0.5	pt	0.75	pt	1	pt	1.5	pt	2	pt	3	pt	4	pt	5	pt

Example: You wish to apply a pesticide at the rate of 1 lb per acre. You purchased a 25% WP. From the table above you find that 4 lb of the 25% WP formulation are needed to provide the necessary dosage of 1 lb per acre.

Equivalents

gal	qt	pt (pint)	fl oz	cups	tbl	tsp	ml
1	4	8	128	16			
	1	2	32	4			
		1	16	2	32		
			1	1/8	2	6	30
				1	16	48	240
					1	3	15
						1	5

PENNSYLVANIA POISON CONTROL CENTERS

(Registered with U.S.P.H.S.)

Town	Center	Phone	Physician(s)
Allentown	Allentown & Sacred Heart Hosp. Centr..... 1200 S. Cedarcrest Blvd. 18105	215-433-2311	Hosp. Dispensary
Chambersburg	Chambersburg Hospital..... 7th & King Sts., 17201	717-264-5171	Owen Hartman
Chester	Sacred Heart Gen. Hosp..... 9th & Wilson Sts., 19013	215-494-0721	Larned, Mangubat, and Rubio
Danville	Giesinger Mem. Hosp..... Montour County, 17821	717-275-6116	Thomas Royer
Easton	Easton Hospital..... 21st & Lehigh Sts., 18042	215-258-6221 Ext. 235,210	Emergency room
E.Stroudsburg	Gen. Hospital of Monroe Cy..... 206 E. Brown St., 18301	717-421-4000 Ext. 666	Emergency room
Erie	Erie Osteopathic Hospital..... 5515 Peach St., 16509	814-864-4031 Ext. 24-42	Owen W. Short
	Hamot Medical Center..... Second & State Sts., 16512	814-455-6711 Ext. 521	physician on duty
	St. Vincent Hospital..... 232 W. 25th St., 16512	814-459-4000 Ext. 300	physician on duty
Hanover	Hanover General Hospital..... 300 Highland Ave., 17331	717-637-3711 Ext. 111	Emergency room
Harrisburg	Harrisburg Hospital..... Front & Mulberry Sts., 17101	717-782-3639	Rosemarie Tursky
	Polyclinic Hospital..... 3rd & Polyclinic Ave., 17105	717-782-4123	Emergency room
Hershey	The Milton S. Hershey Medical Cntr..... 500 University Drive 17033	717-534-6111	Mrs. C. Forrester, R.N. Emergency Care Unit
Johnstown	Mercy Hospital..... 1020 Franklin St., 15905	814-535-5353	David Borecky
Lancaster	St. Joseph's Hospital..... 250 College Ave., 17604	717-299-4546	Cynthia Harrison
Latrobe	Latrobe Area Hospital Ass'n..... 2nd Ave., 15650	412-539-9711 Ext. 208	Emergency room
Lewistown	Lewistown Hospital..... Highland Ave., 17044	717-248-5411 Ext. 391	C. L. Eater, Jr.
Philadelphia	City of Philadelphia, Off. of Medical Exam. 321 University Ave., 19104	215-922-5524, 922-5523	Jane Speaker, Ph.D.
Pittsburgh	Children's Hospital..... 125 Desoto St., 15213	412-681-6669	Richard Moriarity
	St. John's Gen. Hosp..... 3339 McClure Ave., 15212	412-766-8300 Ext. 228	W. C. McCarthy
Scranton	Community Medical Center..... 316 Colfax Ave., 18510	717-343-5566	Emergency room
Sharon	Sharon General Hospital..... 740 E. State St., 16146	412-981-1700 Ext. 281	Theodore Yarboro
Wilkes-Barre	Wilkes-Barre Gen. Hosp..... N. River & Auburn Sts. 18702	717-823-1121 Ext. 222	Lester Saidman
York	Memorial Osteopathic Hosp..... 325 S. Belmont St., 17403	717-843-8623 Ext. 274, 275	James Hotham
	York Hospital..... George St. & Rathton Rd. 17403	717-771-2345	Emergency room

Pennsylvania Public Health Offices (Harrisburg)

State Coordinator, Drug, Device and Cosmetic/Comp. Sect., P.O. Box 90, State Dept. of Health, 17120, phone: 717-787-2307, Watts, 447-2307, J. B. Ogun, Drug Consultant, Div. Drug Control.
Public Health Veterinarian, P.O. Box 90, Vet. Pub. Hlth. Sec., State Dept. of Pub. Health, 17120, phone: 717-787-5460, Watts, 447-5460, E. J. Witte, V. M. D.

WARNING

Use pesticides only when necessary.

Use pesticides only at the recommended dosages and timing to keep residues on crops and animals within the limits set by law.

Avoid spray or dust drift to other crops and bee yards. Cover food and water containers in livestock areas.

Read the label and follow the safety precautions stated. Maintain a pesticide use record and inventory.

Wear protective masks and clothing if the label so directs.

Avoid inhaling pesticides. Never eat or smoke while spraying or dusting.

Avoid spilling spray materials on skin or clothing. If it is spilled, wash immediately with soap and water.

Wash hands and face and change to clean clothing after spraying or dusting. Wash spray clothing after each day's use.

Store pesticides in original containers and out of reach of children, pets, or livestock and away from food or feed. Keep pesticides in a locked storeroom or cabinet marked "Pesticides—Keep Out."

Dispose of empty containers so that they are no hazard to humans, especially children, and animals.

Avoid contamination of the environment with pesticides to cause excessive residues, pollute water supplies, or endanger wildlife.

If poisoning symptoms develop from pesticides, medicines, or any other poison source, show your physician a label of the material involved. He can phone one of the Poison Control Centers for complete information as to treatment.

Before using any pesticides read the precautions

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